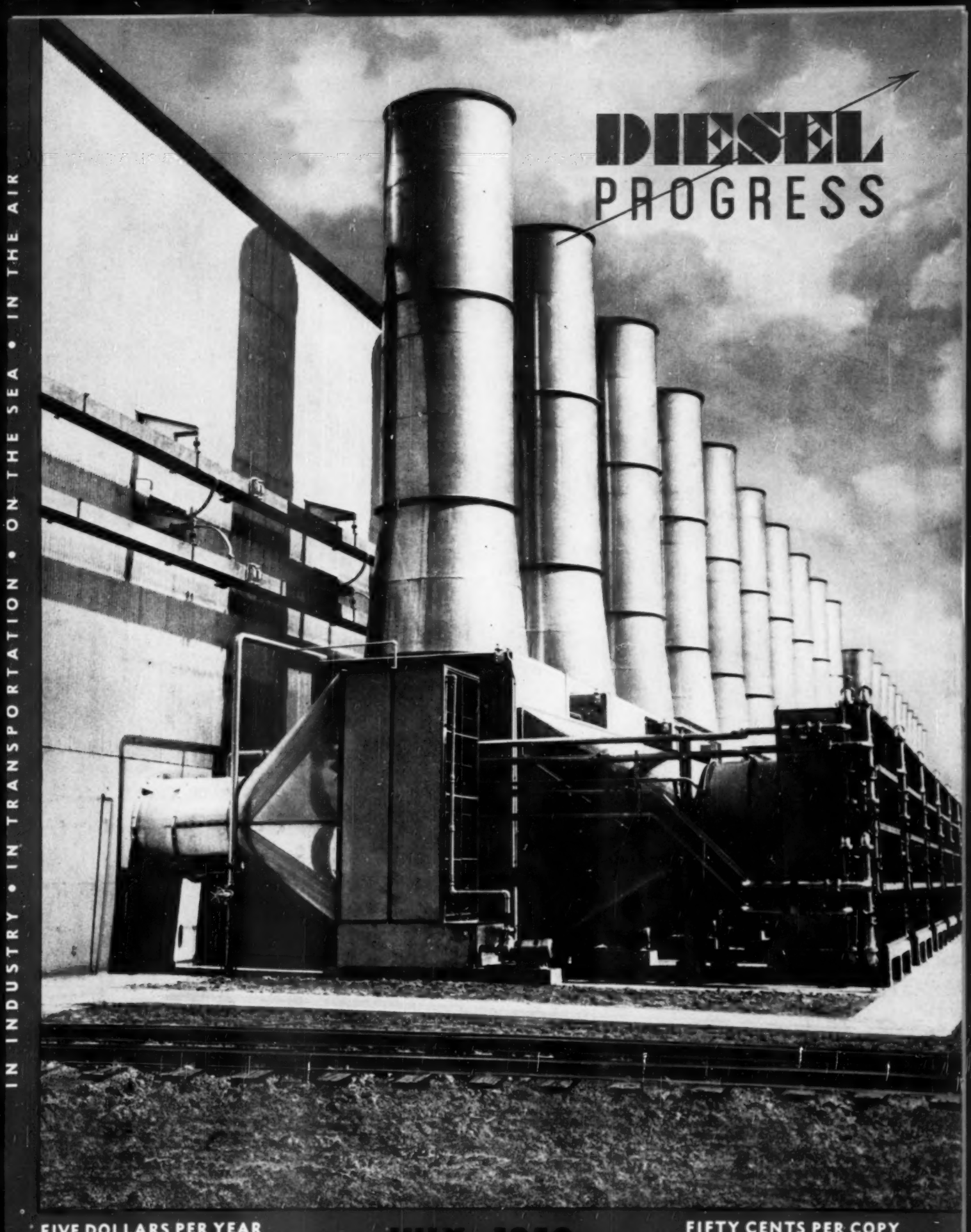

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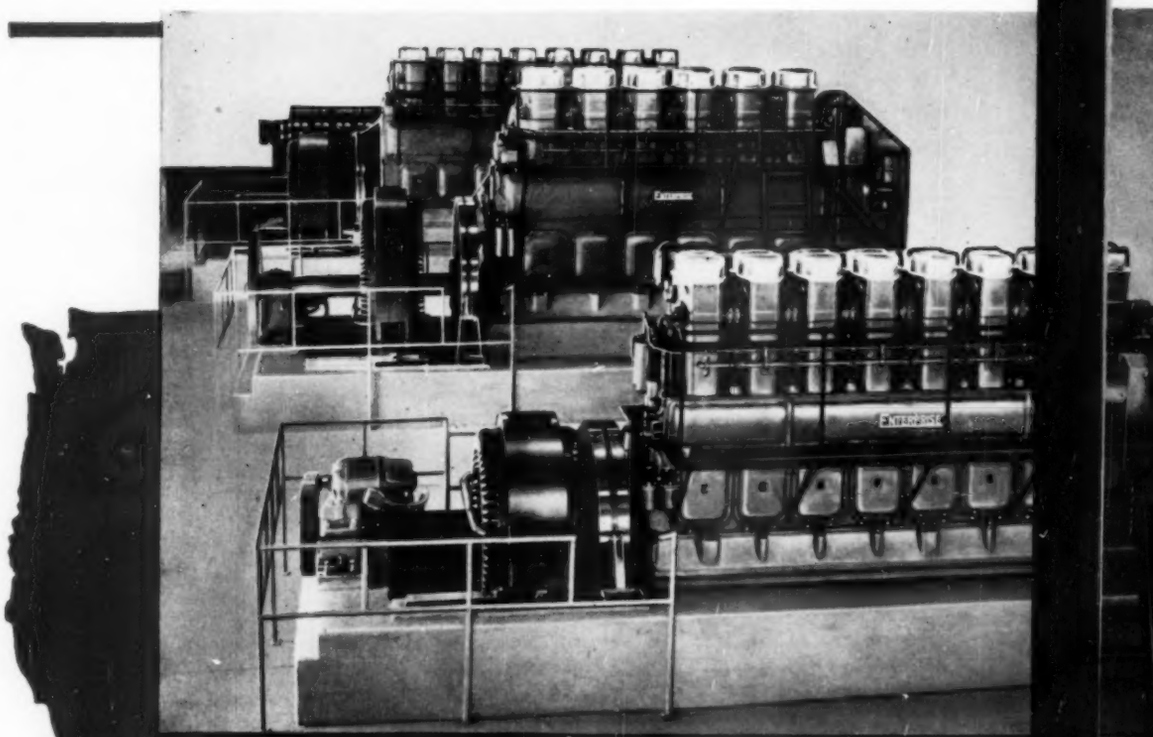

More stationary Diesel h.p. in the U.S. is lubricated with Texaco Ursa Oils than with any other brand.

TEXACO

U

DIESEL PROGRESS for July, 1950, Volume XVI, Number 7. DIESEL PROGRESS is published monthly by Diesel Engines, Inc., 816 North La Cienega Boulevard, Los Angeles 46, California. Rex W. Wadman, President. Subscription rates: $3 per year, single copy 50c. Acceptance under 34.64, P. L. & R., authorized.

...Better Combustion

. . . and less fuel consumption when you lubricate Diesels with TEXACO URSA OILS

TEXACO URSA OILS are especially made to stand up under heat and pressure and to resist oxidation. They keep engines free of harmful carbon, varnish and sludge. Thus, valves stay active, ports open, and rings free for proper seal. Better compression and combustion, and lower fuel consumption result.

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There is a complete line of *Texaco Ursa Oils.* Leading Diesel engine manufacturers approve them, and operators everywhere use them for every type and size of Diesel engine.

Let a Texaco Lubrication Engineer work with you to bring down your Diesel operating costs. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

URSA OILS FOR ALL DIESEL ENGINES

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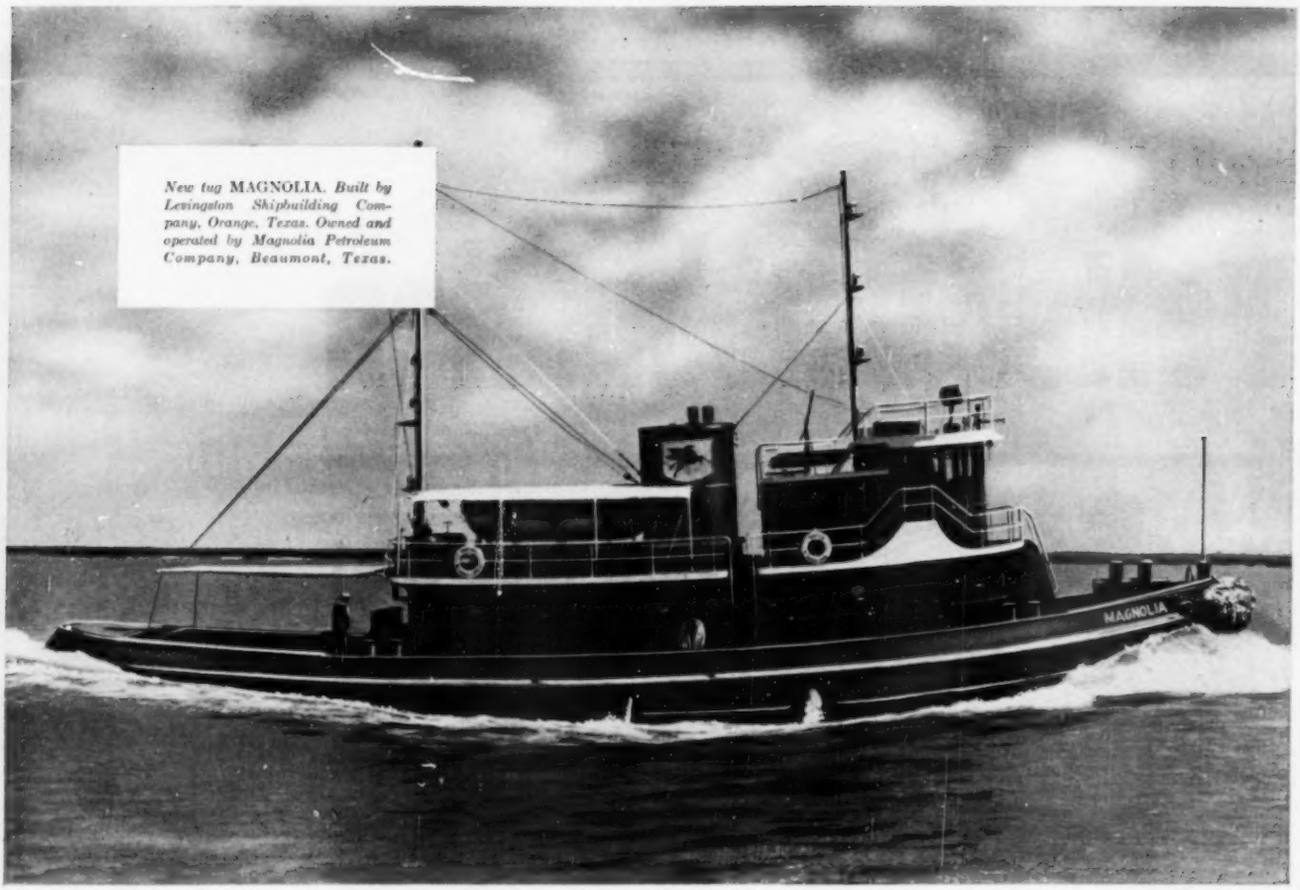

New tug MAGNOLIA. *Built by Levingston Shipbuilding Company, Orange, Texas. Owned and operated by Magnolia Petroleum Company, Beaumont, Texas.*

NEW DIESEL-ELECTRIC TUG
for Service in Texas

ADDITIONAL evidence that experienced vessel operators recognize the efficiency of Diesel-Electric Marine Drive is afforded by the Magnolia Petroleum Company, Beaumont, Texas. Latest addition to their fleet is the new Diesel-Electric tug *Magnolia*, built for canal, harbor, and coastwise service, with headquarters at Beaumont. Powered by General Motors.

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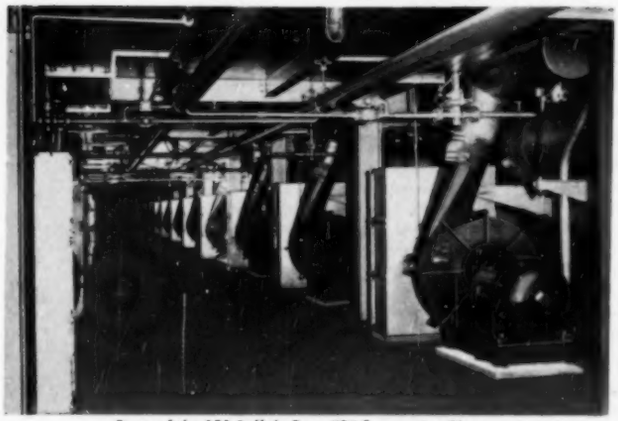
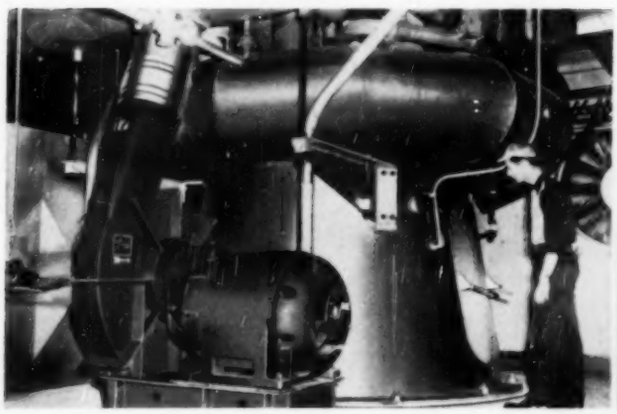
ONE BILLION, TWO HUNDRED NINE MILLION, SIX HUNDRED THOUSAND CU. FT. OF AIR PER DAY "FED" TO ALCOA GAS ENGINES

BY "Buffalo" BLOWERS

One of three engine rooms at the modern plant of Aluminum Co. of America.



Some of the 120 Buffalo Type "R" Scavenging Blowers on this job.



◀ *Close-up of Type "R" Scavenging Blower. Note compact construction, with rotor overhung on gear motor.*

"BUFFALO" MEANS EFFICIENCY IN ANY AIR JOB YOU HAVE

Not the national budget, but a sizeable figure anyway! Whether it's supplying scavenging air to 120 radial 16-cylinder gas engines at the Point Comfort, Texas, plant of Aluminum Company of America—or Diesel cooling or ventilation—"Buffalo" Blowers do the job efficiently. That's because there is a "Buffalo" Fan specifically designed for each class of job, and because the know-how of 72 years of fan manufacturing goes into every "Buffalo" Fan you buy. Write for the facts on your air problem.

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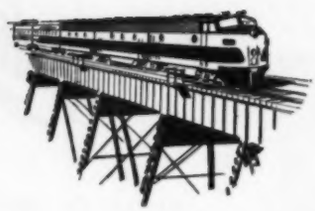

Investment earns 100% annually

For twelve straight years, the Rock Island Railroad's General Motors Diesel-powered streamliners Peoria Rocket and Des Moines Rocket have averaged a net operating profit each year exceeding their original combined purchase price.

Savings achieved through the operation of Diesel Motive power are the bright spots in the railroads' struggle to maintain high standards of service to the public in the face of other constantly increasing operating costs.

Strong, solvent railroads in the hands of competitive industry are essential to America's prosperity and growth. Fifteen years' experience has demonstrated that dieselization with General Motors locomotives is the soundest investment railroads can make.

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A Green Light for Economy in Railroad Operation

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Home of the Diesel Locomotive

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GUN IRON CASTINGS

The hardness and dense, close-grained structure of Gun Iron is ideally suited to give long resistance to erosion or corrosion. When required, this resistance can be further increased by heat treatment and/or proper alloys.

Gun Iron has been used to combat casting erosion on a number of widely varied applications. A typical example is in the case of main cylinder liners in marine diesel engines. Where the coolant water is drawn directly from the sea, the chemical impurities cavitate the liners to the point where they are useless long before they are worn out. Gun Iron liners satisfactorily withstand this erosion and at the same time give longer wear on the cylinder wall. The savings in maintenance and replacement costs reported by users are tremendous.

Gun Iron also provides exceptional resistance to prolonged heats, impact and pressure. The proof of Gun Iron's superiority when used for parts subjected to these problems has been dramatically illustrated thousands of times in the last 139 years. To help determine the specific value of Gun Iron for your strategic cast parts, our engineers and complete laboratory facilities are at your disposal. Our furnaces, foundry and extensive machining facilities stand ready to produce them accurately and economically.

GUN IRON *in the* DIESEL FIELD

Hunt-Spiller casts and machines many important diesel parts for leading diesel engine manufacturers. A few are listed below:

MAIN CYLINDER LINERS • CYLINDER HEADS • PISTONS AND H-S DOUBLE SEAL RINGS • WATER JACKETS • PRESSURE CASTINGS

Chances are that there are many other places where Gun Iron can solve a design or operating problem. To help you determine the value of Gun Iron for your cast parts, our metallurgical department has prepared a comprehensive bulletin which contains complete properties and discussions of Gun Iron and many other metals. Engineers claim it an invaluable reference aid. Send for your free copy today.

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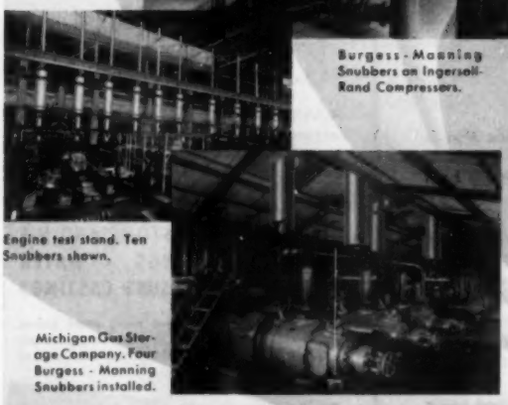
INDUSTRIAL

Factories, Test Stands, Hotels

Pumping Station. Note the four Burgess-Manning Exhaust Snubbers.

Burgess-Manning Snubbers on Ingersoll-Rand Compressors.



Engine test stand. Ten Snubbers shown.

Michigan Gas Storage Company. Four Burgess-Manning Snubbers installed.

UTILITIES

Power Plants, Gas Storage

Electric Power Plant using Burgess-Manning Snubbers.

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Drilling, Pumping, Recycling, Refineries

Burgess-Manning Snubber on 8-cylinder pipe line gathering engine.

For Noise Reduction

On Engine Exhausts and Compressor Intakes . . . Look to Burgess-Manning

Snub the Slug and Stop the Noise

Wherever noise from internal combustion engines, compressors, blowers, vacuum pumps cannot be tolerated, or where flying sparks must be eliminated, America's leading industrial organizations are selecting Burgess-Manning equipment. To meet the growing need for Snubbers and Spark Arresters, Burgess-Manning offers many new types of equipment.

If you are installing an internal combustion engine or compressor, or if you have exhaust or intake noise complaints, let Burgess-Manning submit Snubber recommendations.

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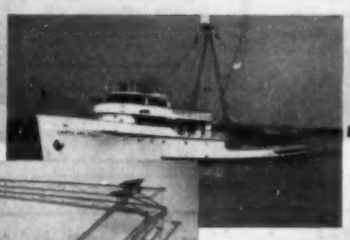
Marine, Railroad, Automobile



Tuna purse seiner, "Santa Helena," uses Burgess-Manning Snubbers.

Portable drilling rig equipped with a Burgess-Manning Spark Arrester-Snubber.

Diesel locomotive employs Burgess-Manning Snubbers.

Generator end of Diesel. Note Burgess-Manning Snubbers in foreground.

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YOU CAN BE **SURE**.. IF IT'S

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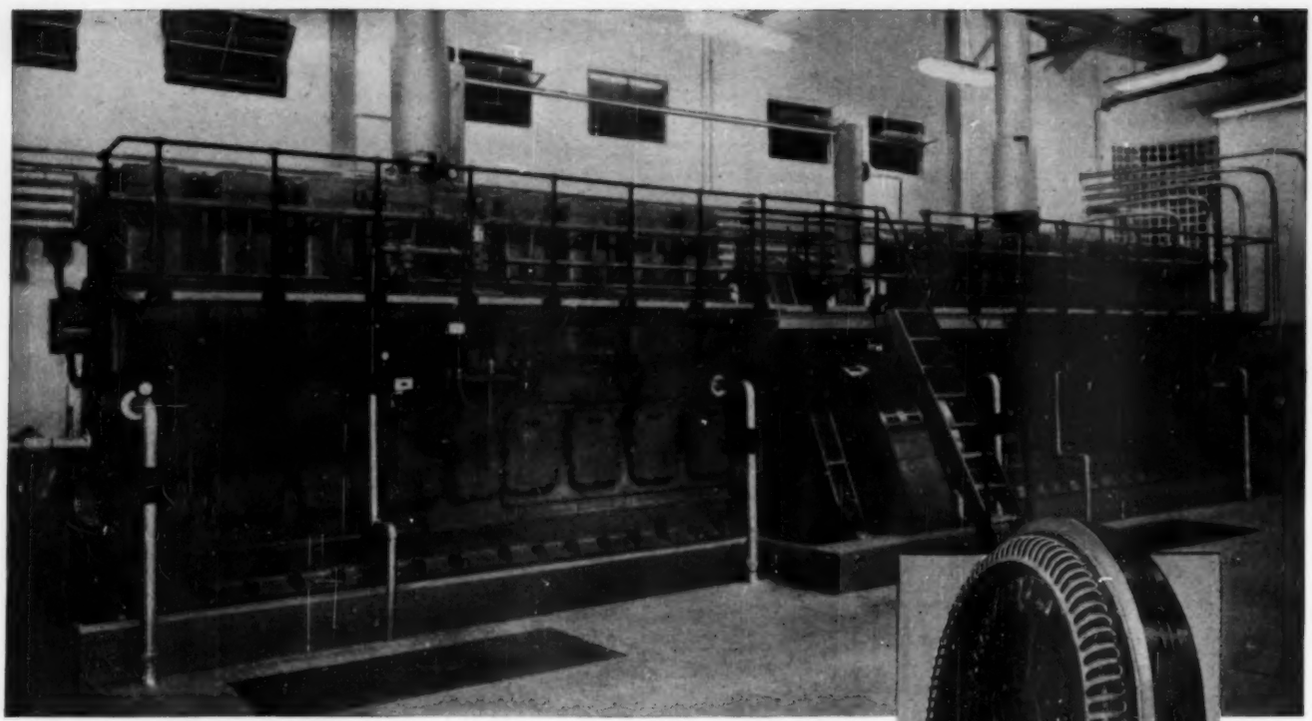
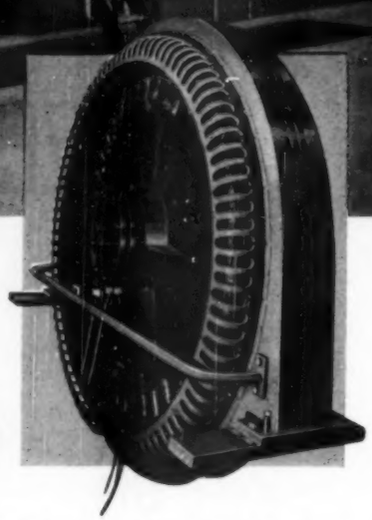




What you can't see...the PLUS added by Westinghouse Engineering

The only job of those big twin diesels, pictured above, is driving the Westinghouse A-C Generator almost lost in between them. An unusual installation—the first of its kind. Like many firsts, it too, presented problems. Insulating against the flow of shaft currents was one of them. Coupling the shaft looked like the answer—*if* an insulated coupling could stand up to the terrific driving force of the twins . . . *if* it lost no torque . . . *if* it could take it for at least a year without maintenance.

The engine builders asked Westinghouse, suppliers of the generator, to tackle the problem.

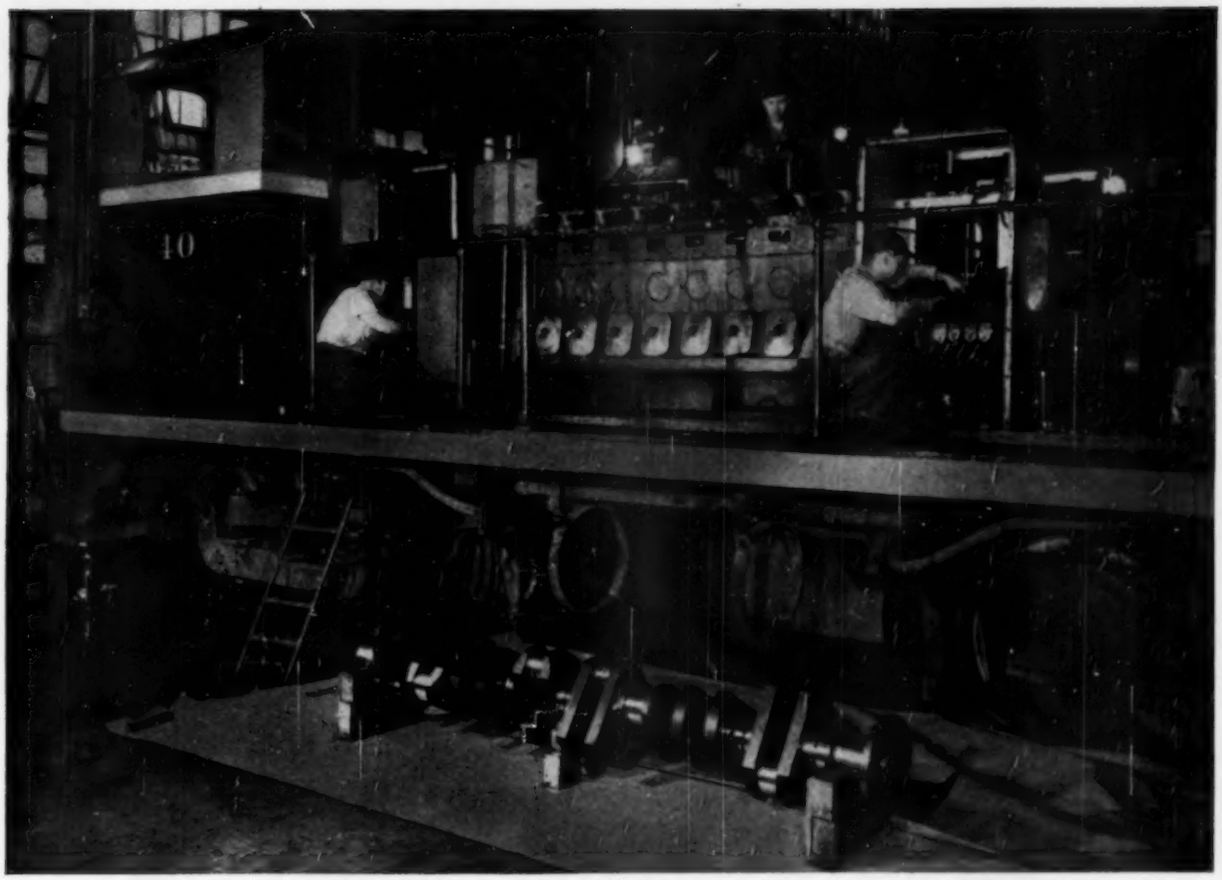
Westinghouse engineers designed an insulated coupling that did the job—and more, paving the way for future installations of this type.

This example shows the problem-solving ability offered by Westinghouse in building special generators for unusual applications.

Make certain you get the benefit of Westinghouse engineering on your next equipment. Power Apparatus Specialists—in principal cities—will help you select and apply the right equipment to the job. Consult them for any present or future plans. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21571

Westinghouse

DIESEL ENGINE DRIVEN AC GENERATORS



Diesel switchers benefit by...

● The Diesel switchers at Inland Steel's Indiana Harbor plant haul punishing loads of slag, ore, and steel on a 'round-the-clock schedule. On this difficult operation, excellent maintenance practices and the use of STANDARD HD Diesel Oil have kept engine availability high and upkeep at a minimum. An outstanding benefit of effective lubrication was revealed recently when a veteran Electro-Motive engine was completely overhauled for the first time in 13½ years of service.

The crankshaft in this Diesel had never been removed. Now, after 92,484 hours of operation, it showed no more than .008-inch wear on any of the main bearings and only .006-inch wear on any of the connecting-rod bearings.

More than 60 railroads now use STANDARD HD Diesel Oil on their heaviest passenger and freight runs. This acceptance indicates the ability of this truly heavy-duty oil to provide effective lubrication for all types of Diesel locomotives. Make that your basis for investigating STANDARD HD Diesel Oil.

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TRADE MARK
Diesel Oil

Write Standard Oil Company (Indiana), 910 S. Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY (INDIANA) STANDARD

MADISON-KIPP *Fresh Oil* LUBRICATORS

. . . provide the most dependable method of lubrication ever developed

Oil under pressure fed drop by drop from a Madison-Kipp Lubricator will definitely increase the production potential for years to come when applied as original equipment on new machine tools, work engines, and compressors. There are six popular models for every application. Write for special engineering data for your particular requirement.

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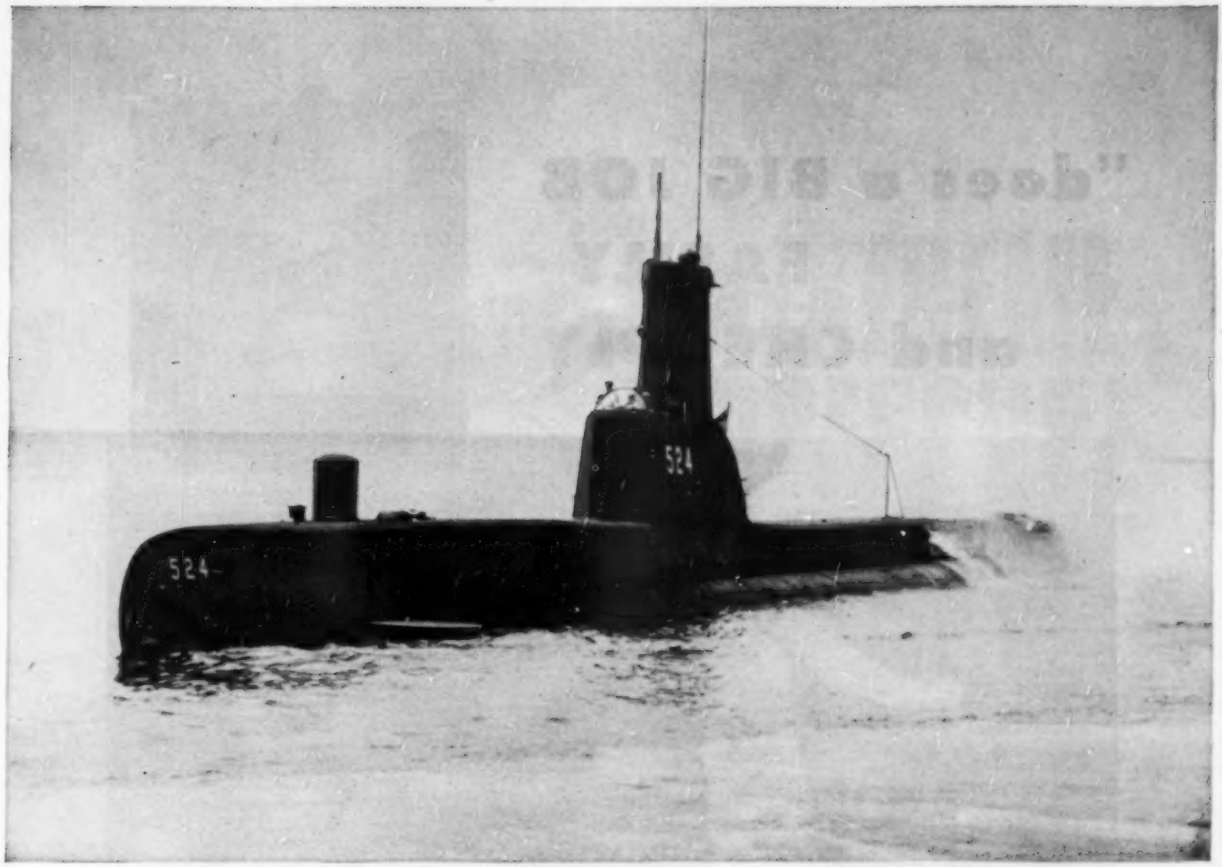

505-Hour Submerged Run...

with OPPOSED-PISTON HORSEPOWER!

When the guppy-snorkel submarine *Pickerel* arrived at Pearl Harbor on April 5th, she had made submarine history—completed a 5200 mile, 505-hour *submerged run* from Hong Kong—and added another page to the history of the outstanding performance of Opposed-Piston diesel engines in all marine services. Her four Opposed-Piston diesels performed flawlessly throughout the trip.

You may not be buying submarines . . . but the same advantages that the Opposed-Piston diesel engine brings to these new guppy-snorkels are important to you: more power per square foot of floor space, 40% fewer moving parts, lower piston travel speeds—and a record of over four million horsepower performing in the toughest kind of diesel engine services. Get the information on Opposed-Piston diesel horsepower for your marine requirements from your nearest Fairbanks-Morse branch office.

FAIRBANKS-MORSE,

a name worth remembering

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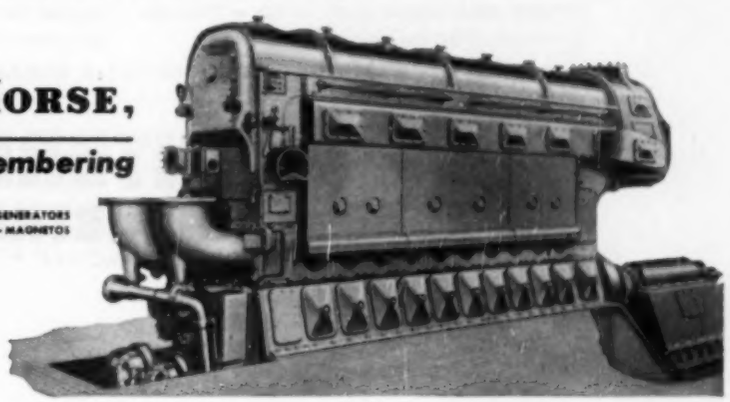
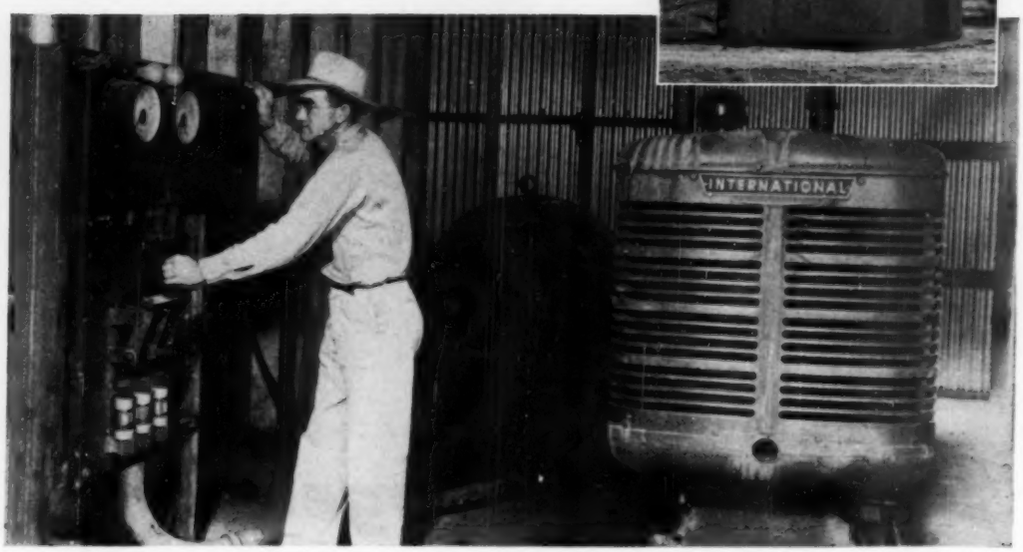


"does a BIG JOB EASILY and CHEAPLY"



Asan Trahan owned an International UD-18 engine for seven years. This unit drove a generator furnishing electric power for his rice drying mill at Kaplan, La. When the mill burned last year, he rebuilt it and selected an International UD-18A for his power plant. The new engine drives a generator furnishing all the mill's electric power.

"The engine destroyed in the fire ran for seven years without repair," says Mr. Trahan. "Any other engine is out as far as I'm concerned. I like International engines."

"The UD-18A does a big job easily and cheaply with no trouble at all," Mr. Trahan continues. "We start it and forget all about it. We save enough money on power in one month to buy a whole season's fuel for the engine."

Can you afford to be without power like this? Your International Industrial Power Distributor or Power Unit dealer will be glad to help you select an International engine for your job . . . the surest way to get power to do a big job easily and cheaply.

INTERNATIONAL HARVESTER COMPANY • Chicago

INTERNATIONAL INDUSTRIAL POWER

CRAWLER TRACTORS • WHEEL TRACTORS • DIESEL ENGINES • POWER UNITS

*EXTREME PRESSURE

All production machinery will last longer — give better service — if the proper lubricant is used. That's why you will find it profitable to use high quality Tycol oils and greases in your plant.

There's a reason! No matter what your lubricating need — *EXTREME PRESSURE, high or low temperature, high speed or any other service condition — there's a Tycol oil or grease suited to your specific requirements.

Refined from the highest grade crudes, Tycol lubricants are exceptionally resistant to breakdown which means greater economy . . . longer machine life for every type of equipment.

Tide Water Associated will gladly recommend the Tycol lubricant that meets your particular requirements. Call, write or wire your nearest Tide Water Associated office today.

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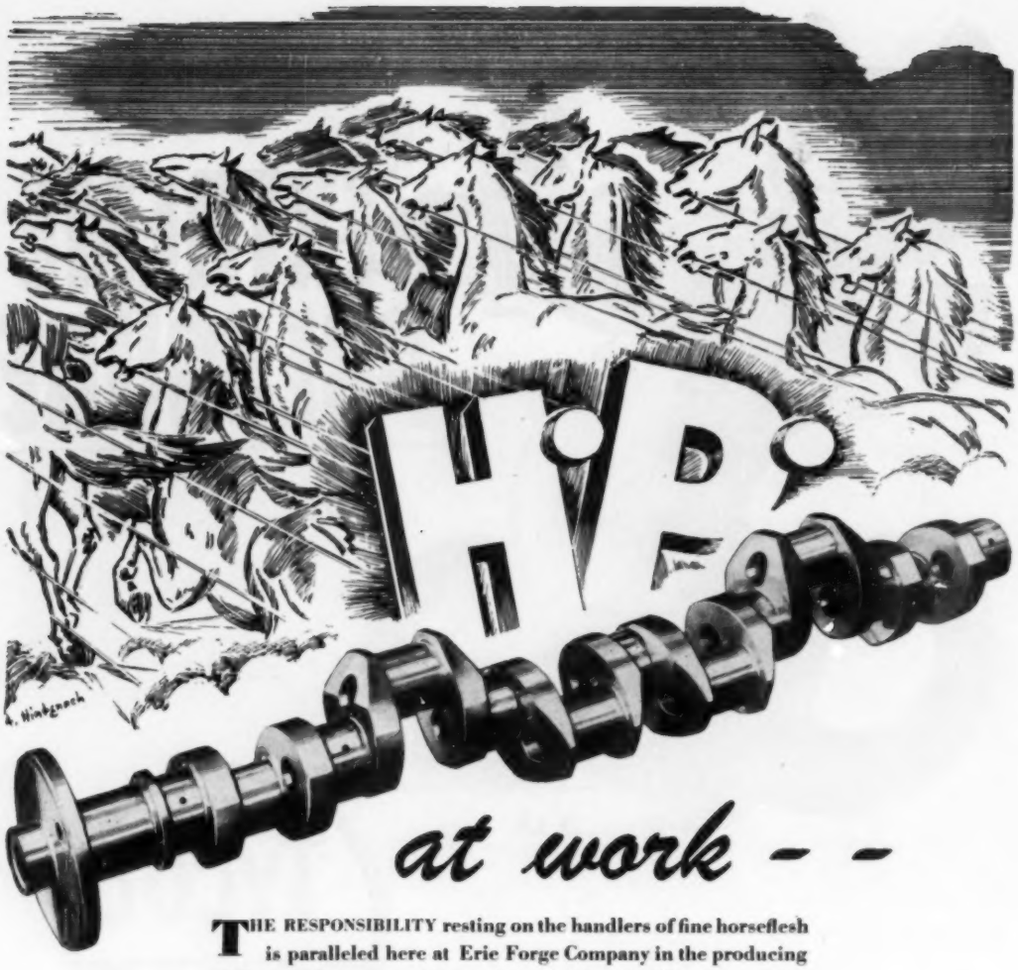
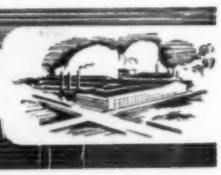
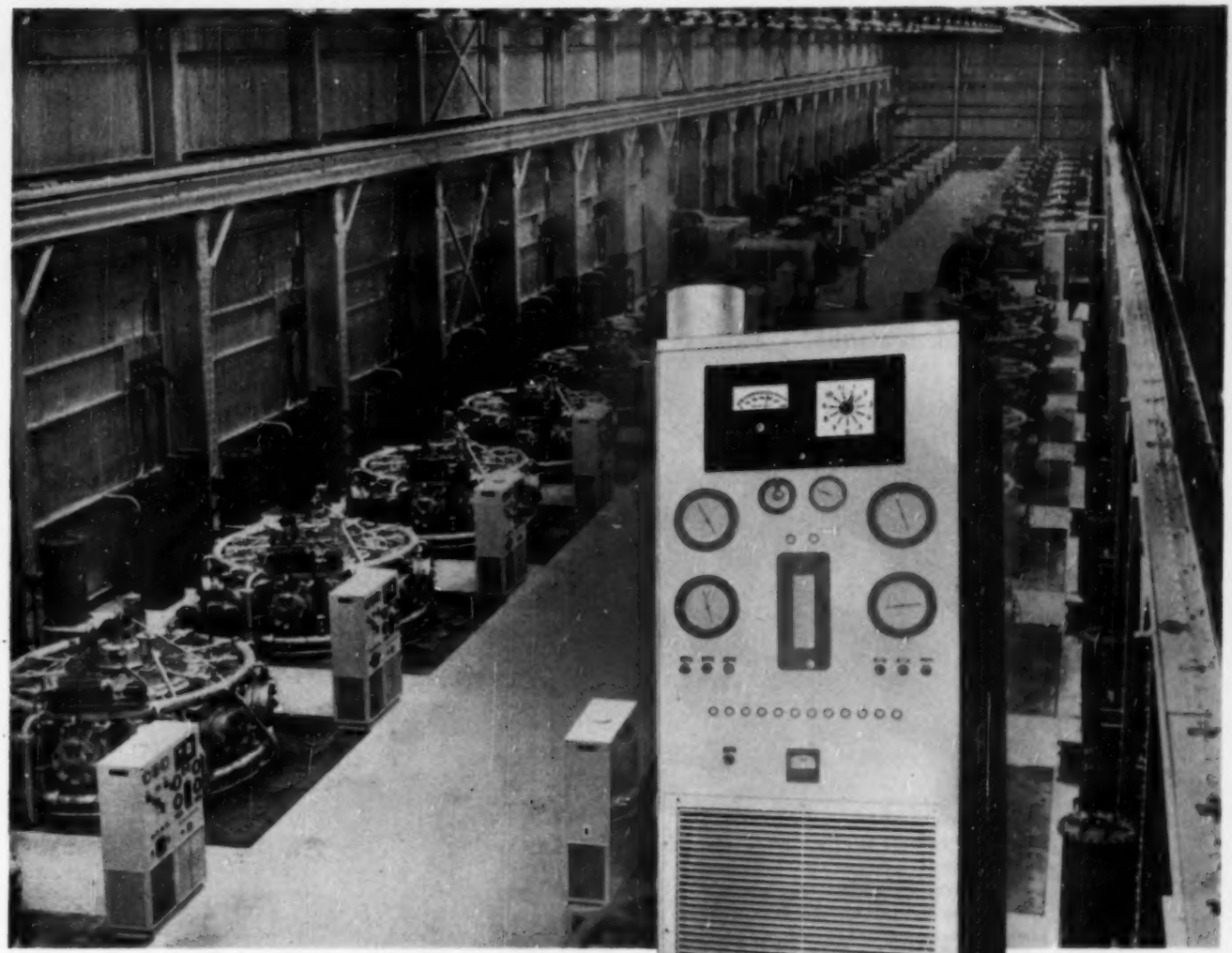


at work - -

THE RESPONSIBILITY resting on the handlers of fine horseflesh is paralleled here at Erie Forge Company in the producing of fine cranks, connecting rods and drive shafting for putting Diesel Power to work. Design, Engineering, Metallurgical Control . . . Craftsmanship from raw material-working to precision machine-finishing . . . "Know How" gained by years of intelligent, watchful work . . . These are the One Responsibility and One Control you buy when your specifications become finished products at Erie Forge. Submit your specifications . . . we shall consult with you promptly and with experienced eyes . . . . Together we can create a finer product for you.

ERIE FORGE COMPANY, ERIE, PA.





Alcoa Power

world's largest internal combustion plant

Alnor Protected

Here you see one-third of the engines that comprise the world's largest internal combustion power plant—120 Nordberg engines in all, totaling 192,000 hp.

While this tremendous power is impressive, size is not the only outstanding feature. Each of the 120 engines is equipped with an Alnor Pyrometer specially designed for this installation. Now standard in the Alnor line, the type 1160 Pyrometer continuously monitors exhaust temperatures . . . *automatically* checks all cylinders, anticipating trouble from preignition, detonation, overloading or lubrication breakdown. Easily read from at least 20 feet, this instrument allows supervision by a minimum force.

Such automatic, constant protection reduces maintenance time and expense to a minimum — increases efficiency and operating economy.

Why not ask for Alnor assistance in solving your diesel pyrometer problems? Chances are your Alnor representative can help you select the right equipment for maximum protection from our full line of diesel exhaust pyrometers and thermocouples. If not, Alnor Engineering Service stands ready to assist you—as it has so many times in the past.

Alnor **PRECISION INSTRUMENTS FOR EVERY INDUSTRY**

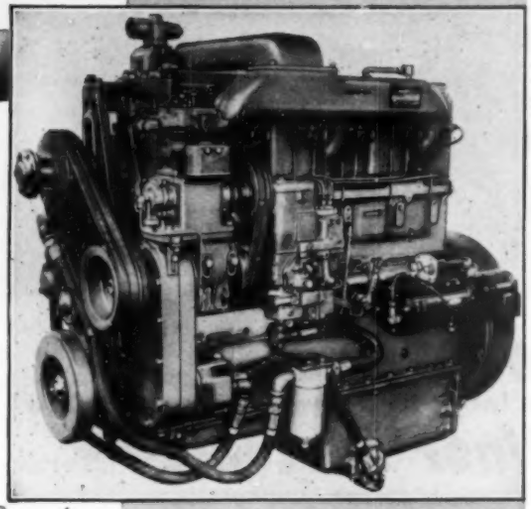
ILLINOIS TESTING LABORATORIES, INC.

Room 508, 420 N. La Salle Street • Chicago 10, Illinois

FLEXIBLE HOSE LINES

WITH DETACHABLE, REUSABLE FITTINGS

Always first
ON DIESEL ENGINES



Save time, save money and reduce inventory by putting the "Aeroquip Idea" to work for you. With Aeroquip you make your own flexible hose assemblies by cutting bulk hose to desired lengths and attaching Aeroquip Reusable Fittings. Assembly can be accomplished quickly and easily right on the job. No special tools are required. No training is needed. Aeroquip high quality Flexible Hose Lines improve performance and reduce maintenance. They eliminate leaks due to vibration and operate dependably at extremely high or low temperatures. They are widely used for hydraulic fluid, water, air, lubricating oils, gas and Diesel fuels and many other fluids.

Always first

B.D. Check into this money saving idea—Jim

Because this Diesel Engine is plumbed with Aeroquip Flexible Hose Lines, replacement of any fluid-carrying line can be accomplished in a fraction of the time required for forming and fitting rigid tubing. Aeroquip Hose Lines are fire resistant and eliminate failure due to vibration.

AEROQUIP CORPORATION

JACKSON, MICHIGAN

SALES OFFICES AND WAREHOUSES: 1053 NO. HOLLYWOOD WAY, BURBANK, CALIF. 1215 SO. EAST GRAND AVE., PORTLAND 14, ORE. 2912 N. E. 28TH ST., FORT WORTH 11, TEXAS 72-74 STAFFORD STREET, TORONTO, CANADA 4301 N. W. 36TH ST., MIAMI SPRINGS, FLORIDA

SALES OFFICES: 303 WAREHAM BLDG., HAGERSTOWN, MD. 1419 2ND AVE., SO., MINNEAPOLIS 4, MINN.

AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U. S. A. AND ABROAD

HILCO

FOR ALUMINUM COMPANY OF AMERICA'S NORDBERG ENGINES...

Those who know select **HILCO**

Whether you operate 100 or 100,000 h.p. there is a HILCO that will best take care of your gas or diesel engine lubricating oil maintenance—proven performance and service for one quarter century.

A trained HILCO field engineer will gladly survey your oil maintenance problem and make recommendations with no obligation on your part.

★ Before you specify or buy lubricating or fuel oil filters, reclaimers, purifiers or conditioners, send for FREE HILCO literature.

THE HILLIARD CORPORATION, 122 W. FOURTH ST., ELMIRA, N. Y.

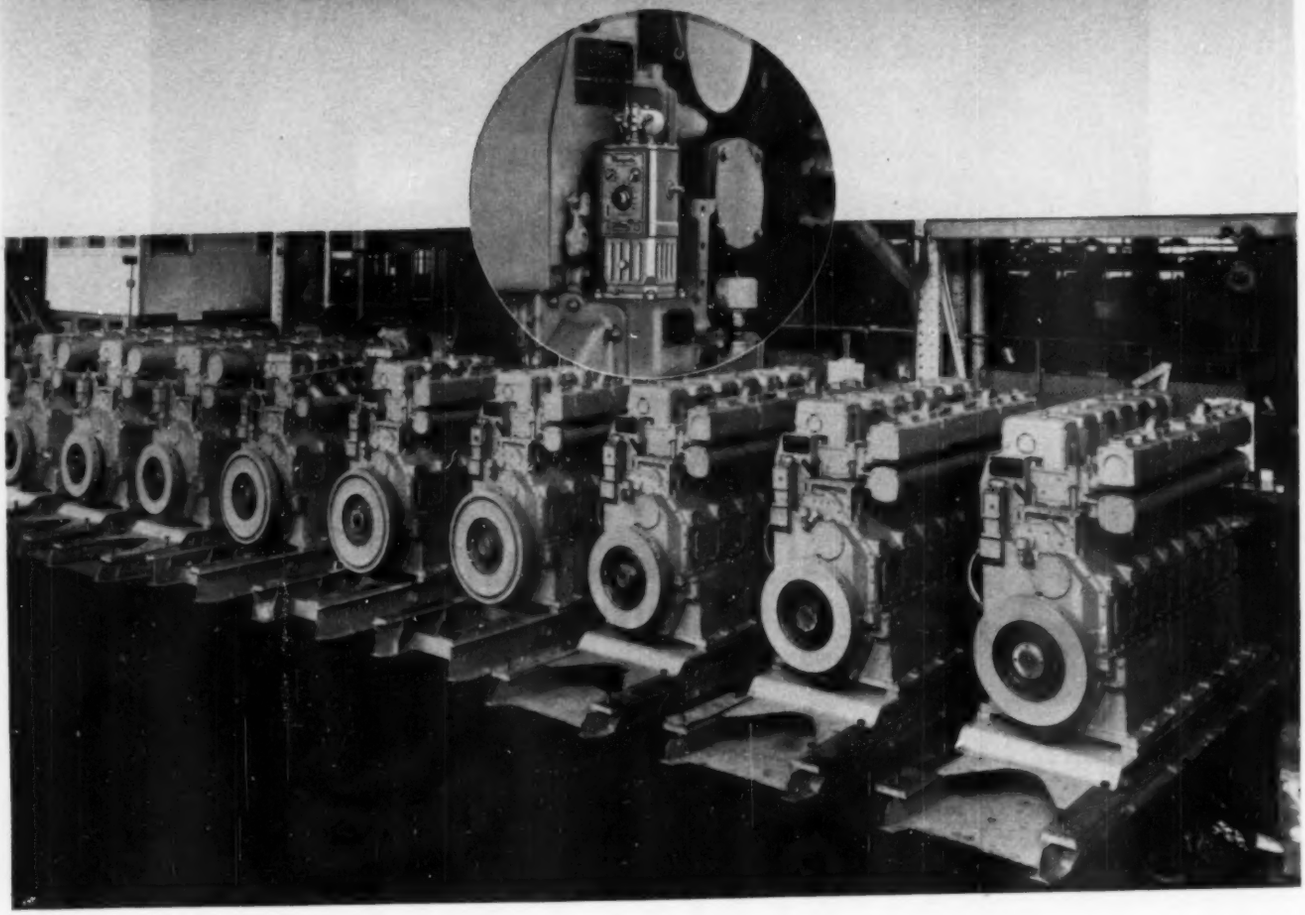
Photo Below Shows Erection Floor Production Area of

NORDBERG FS-9 and FS-13 DIESEL ENGINES

EQUIPPED WITH

Marquette

HYDRAULIC SPEED REGULATING GOVERNORS



The Marquette

METAL PRODUCTS CO.

CLEVELAND 10, OHIO

SUBSIDIARY OF CURTISS-WRIGHT CORPORATION

Manufacturers of

ROLLER BEARING TEXTILE SPINDLES

SUPERCHARGER PARTS AND ASSEMBLIES

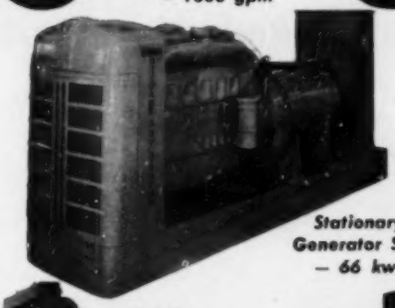
You can depend on

PACKAGED POWER UNITS

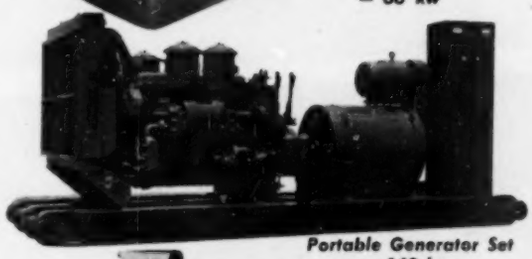
engineered and manufactured by

STEWART & STEVENSON SERVICES, Inc.

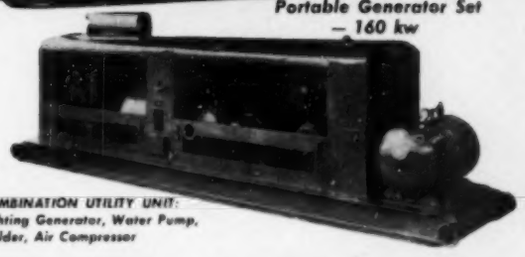
Mobile Pumping Unit — 1000 gpm



Stationary Generator Set — 66 kw



Portable Generator Set — 160 kw



COMBINATION UTILITY UNIT: Lighting Generator, Water Pump, Welder, Air Compressor

Stewart & Stevenson have long specialized in the production of dependable power and pumping units for contractors. These units are powered by GM Diesel or Continental Red Seal gas/gasoline/butane engines—skid-mounted or trailer-mounted for easy handling.

The unit you purchase from Stewart & Stevenson is designed and engineered to do a specified job . . . with up to 30% reserve power above its rated capacity. It is guaranteed to do that job—with complete satisfaction to you—or any money paid is refunded in full.

This guarantee . . . of satisfactory performance or your money back . . . is absosolutely ironclad. Stewart & Stevenson is able to make such a guarantee on the basis of years of experience in the production of thousands of packaged power units for Texas contractors. This manufacturing know-how further benefits you with lower prices.

Stewart & Stevenson backs up every sale with state-wide parts and service facilities. Complete parts for every installation sold—plus 24-hour-a-day service throughout Texas — safeguard you against down-time. Day or night throughout the year, a Stewart & Stevenson serviceman stands ready to go to work on your job within two hours of your telephone call—from any point in Texas.

For complete information about packaged power units . . . or for consultation regarding a special power application for you . . . phone, write or wire us today. Our representative will gladly call on you, and there's no obligation on your part in talking with him.

2000

STEWART & STEVENSON SERVICES, Inc.

Main Office and Plant: 4516 Harrisburg Blvd., Houston 11, Texas. Phone WOodcrest 9691
Branches: Corpus Christi, Dallas, Lubbock, McAllen, Wichita Falls.

Distributors of: General Motors Diesel Engines, Continental Red Seal Engines, Chicago Pneumatic Engines, Gardner-Denver Pumps

Fabricators of: Electric Power Units, Electrical Control Equipment, Portable Pumping Units, Truck Bodies, Hurricane Stalk Shredders

PARTS... SERVICE

STEWART & STEVENSON SERVICES — Anytime Anywhere

THE NATION'S LARGEST DISTRIBUTORS OF GM DIESEL ENGINES

120 NORDBERG

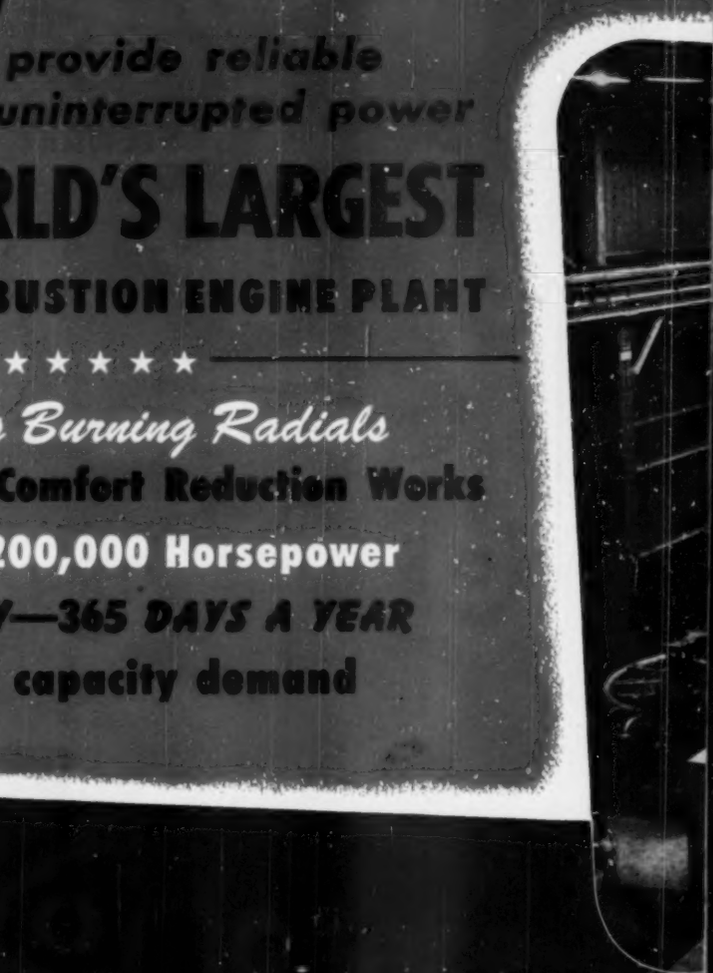
provide reliable uninterrupted power

in the **WORLD'S LARGEST**

INTERNAL COMBUSTION ENGINE PLANT

★ ★ ★ ★ ★ ★

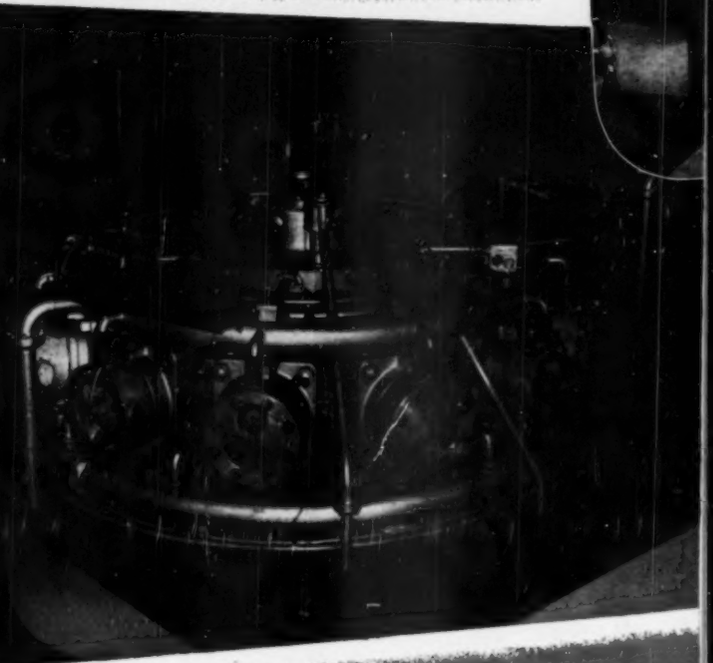
NORDBERG *Gas Burning Radials*
at Alcoa's Point Comfort Reduction Works
provide nearly 200,000 Horsepower
24 HOURS A DAY—365 DAYS A YEAR
to meet the full capacity demand



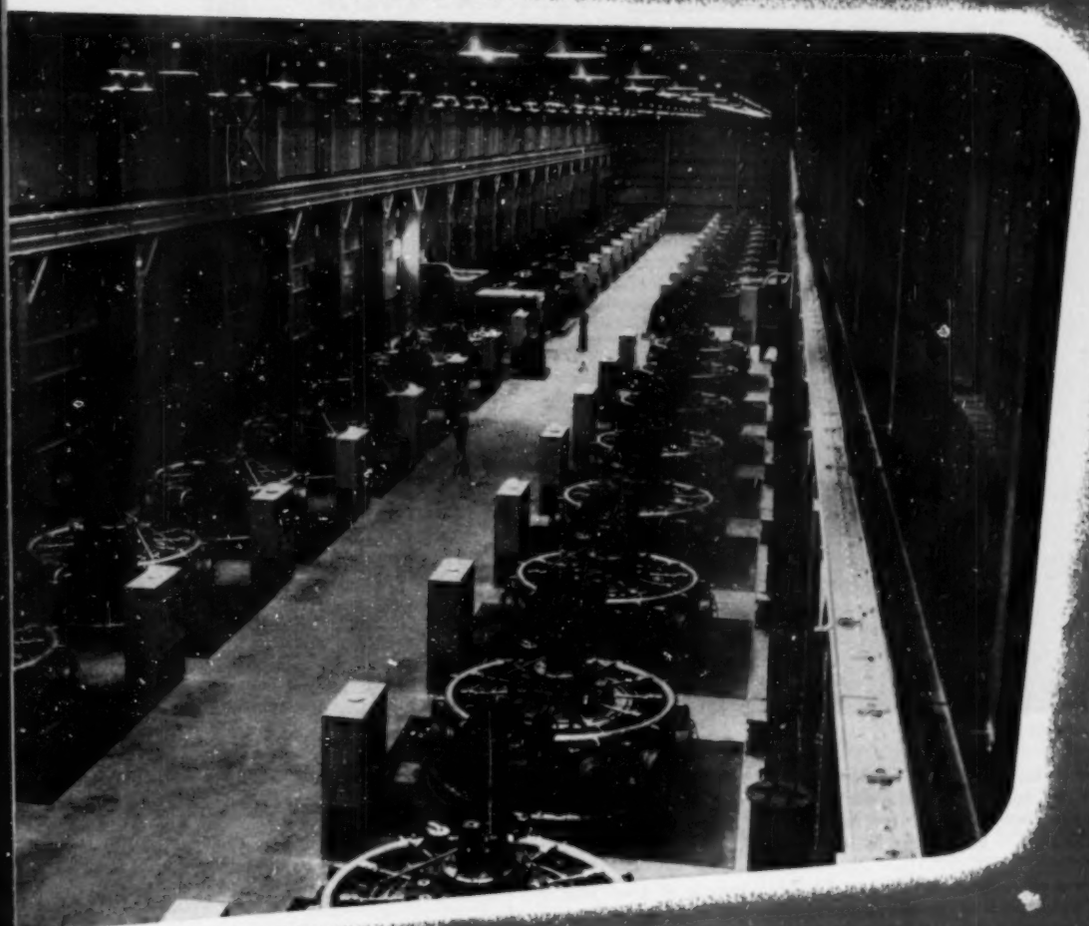
Important features of
NORDBERG *Radial* **ENGINES**

- LOWER INVESTMENT COST
- LOWER INSTALLATION COST
- LOWER OPERATING COST
- LOWER MAINTENANCE COST
- LESS SPACE REQUIRED
- AVAILABLE THREE WAYS . . . as oil burning Diesels, as natural gas engines, or as Duafuel engines.

*Applicable for industrial and municipal power plants and central stations or wherever compact, economical, dependable power is required. For full details covering Nordberg Radials, send for BULLETIN 172.



Radial ENGINES



IN planning the Point Comfort (Texas) Reduction Works, Aluminum Company engineers were confronted with the tremendous task of providing sufficient electric generating capacity to produce over 180,000,000 pounds of aluminum per year. By specifying 120 Nordberg two-cycle Radial Engine Generating Units as the solution to this huge power problem, Alcoa took advantage of these important economy factors:

(1) *Reduced investment cost* . . . engine-generating unit cost . . . installation cost (building also is 50% of usual requirements).

(2) *Reduced operating cost* . . . fuel cost . . . maintenance cost.

(3) *The experience offered by Nordberg as the producer of America's largest line of heavy duty internal combustion engines.*

This tremendous installation exemplifies the way in which Nordberg Diesel Engines, in sizes from 10 to 9600 hp., are used to provide dependable, economical power for stationary and marine requirements all over the world.

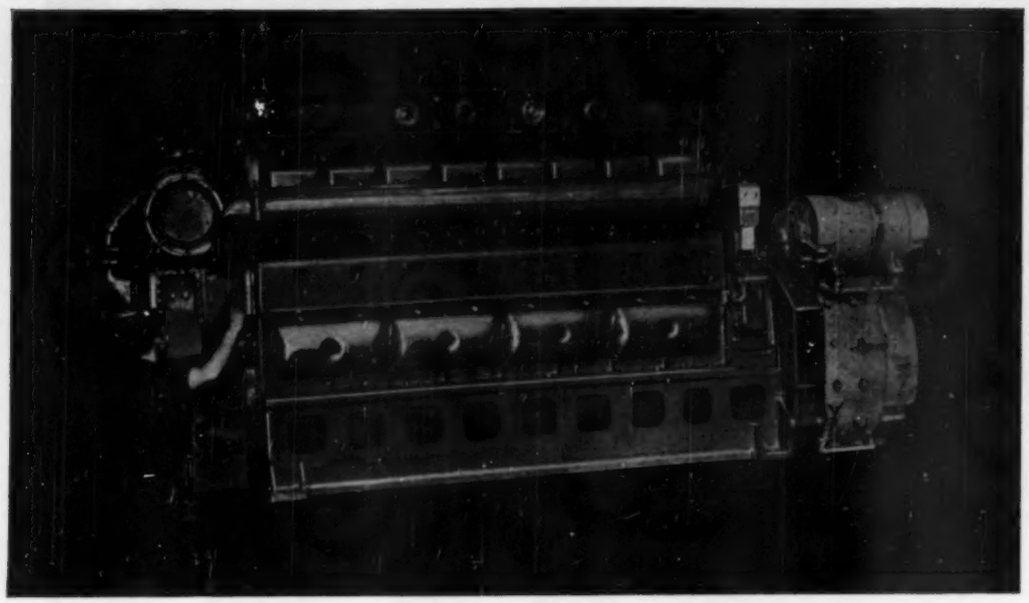
NORDBERG MFG. CO., Milwaukee, Wis.

MSCH-SULZER A DIVISION OF NORDBERG

NORDBERG DIESEL ENGINES

1200 *horsepower*

in a small package



This is the turbo-charged engine that is establishing such an excellent reputation for smooth horsepower, reliability and low maintenance costs in Lima-Hamilton's 125 ton railroad switcher. It develops 1200 bhp at 950 rpm — from eight in-line cylinders of only 9-inch bore, 12-inch stroke.

With over-all dimensions of only 13′ 5½″ length, 4′ 2¾″ width and 6′ 7″ height, it is as compact a heavy-duty engine as you will find. Weight is approximately 19,800 pounds.

This engine has a number of features that will interest any diesel operator: Major points, like intercooling of inlet air which produces lower temperatures throughout the cycle — and helps keep maintenance down. Little features, like the tell-tale holes that warn of any water leak which might otherwise reach the crank case.

Full information on this engine can be obtained through Lima-Hamilton offices in New York, Chicago and other principal cities, or by writing directly to Lima-Hamilton Corporation, 500 Hooven St., Hamilton, Ohio.

A six-cylinder version of this engine, developing 900 hp is also in current production. Both six and eight cylinder engines are available naturally asperated as well.

LIMA HAMILTON CORPORATION

DIVISIONS: *Hamilton, Ohio* — Niles Tool Works Co.; Hooven, Owens, Rentschler Co. *Lima, Ohio* — Lima Locomotive Works, Inc.; Lima Shovel and Crane Division. *Middletown, Ohio* — United Welding Co.

PRINCIPAL PRODUCTS: Hamilton diesel and steam engines, Niles heavy machine tools, Hamilton heavy metal stamping presses, Hamilton-Kruse automatic can-making machinery, Locomotives, Shovels and cranes, Special heavy machinery, Heavy iron castings, Weldments.

KOPPERS NEW K-SPUN PISTON RINGS

cut Diesel "Down Time"

Railroads Slash Maintenance Costs with Amazing New KOPPERS Piston Rings

that DOUBLE mileage between overhauls, cut cylinder wear in half!

EVERY DAY, on every road, you can see these rugged Diesels highballing with thousands of tons of freight and passenger cars . . . keeping right on schedule, up grade, down grade . . . through scorching desert heat and icy northern blizzards. It's a job that's plenty hard on engines—and on piston rings! But amazing new Koppers K-Spun Piston Rings take this rough, tough service right in their stride . . . lasting up to *twice as long as ordinary rings!* And that's not all . . . Koppers rings *decrease cylinder wall wear up to 50%!*

Here at last are the piston rings that cut Diesel maintenance costs *in half* . . . lengthen the life span of expensive equipment . . . boost mileage, service *and profits* to a new high! Check into the operating costs of *your* Diesels today . . . and next time you overhaul, specify Koppers Piston Rings . . . then watch costs go *down,* service go *up!*

Koppers complete engineering facilities are at your service. Whatever your piston ring problem may be—steam, Diesel, gasoline engines, pumps, compressors—we can help you solve it quickly and economically. Write: KOPPERS COMPANY, INC., *Piston Ring Department,* 1537 Hamburg St., Baltimore 3, Md.

Only Koppers can furnish K-Spun

What is Koppers K-Spun?

Koppers K-Spun is an entirely new type of ring iron created by an exclusive centrifugal casting process, which forms graphite into large nodules instead of fine flakes. Large graphite nodules in K-Spun cast iron eliminate the many planes of weakness inherent in ordinary cast iron . . . impart to K-Spun *100% more strength, 50% more elasticity, four times more shock resistance!* K-Spun Rings are guaranteed not to break in installation or in service! Available up to 12¼" diam.

What is Koppers Porous Chrome?"

Koppers Porous Chrome is a chrome-plated ring with a *porous surface* that holds and distributes oil during break-in, quickly wears down to perfectly seated *solid chrome* that prevents grit or other particles from imbedding in the ring surface and scratching cylinders. Porous Chrome Rings last up to four times as long as ordinary rings, reduce cylinder wear 50% or more! Available in any size on specification in quantities of 100 or more. Do not use against chrome liners.

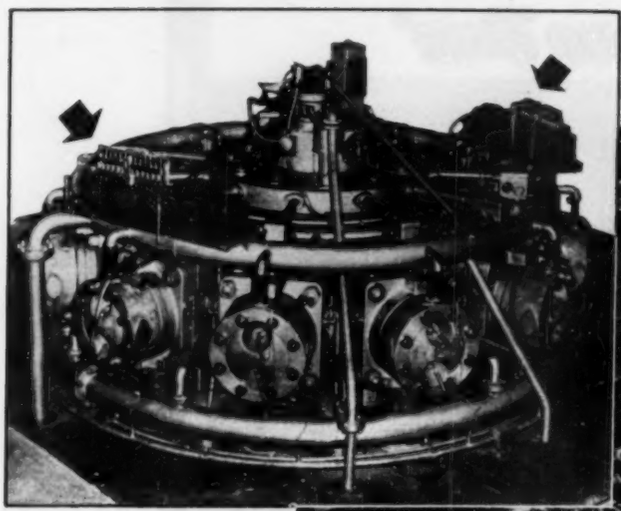
KOPPERS

KOPPERS PISTON RINGS

Naturally

IT'S MANZEL FORCE FEED LUBRICATION

In the New Alcoa Plant described in this issue *



See also the Manzel installation described on page 46

IN its huge new Port LaVaca plant the Aluminum Company of America has installed 120 Nordberg 1600 hp., eleven cylinder radial gas engines. Each of the engines is equipped with two 12 feed Manzel Model 82 Force Feed Lubricators . . . a total of 240 individually motor driven units. Especially adapted for use on these new and revolutionary engines, the lubricators supply an accurately metered amount of oil to engine cylinders with unfailing regularity. "Manzels" drastically reduce labor, maintenance, and overhead costs. Over 50 years they have proven their dependability, accuracy, and economy.

Naturally, in this great plant, and in the majority of power plants — it's Manzel Force Feed Lubrication.

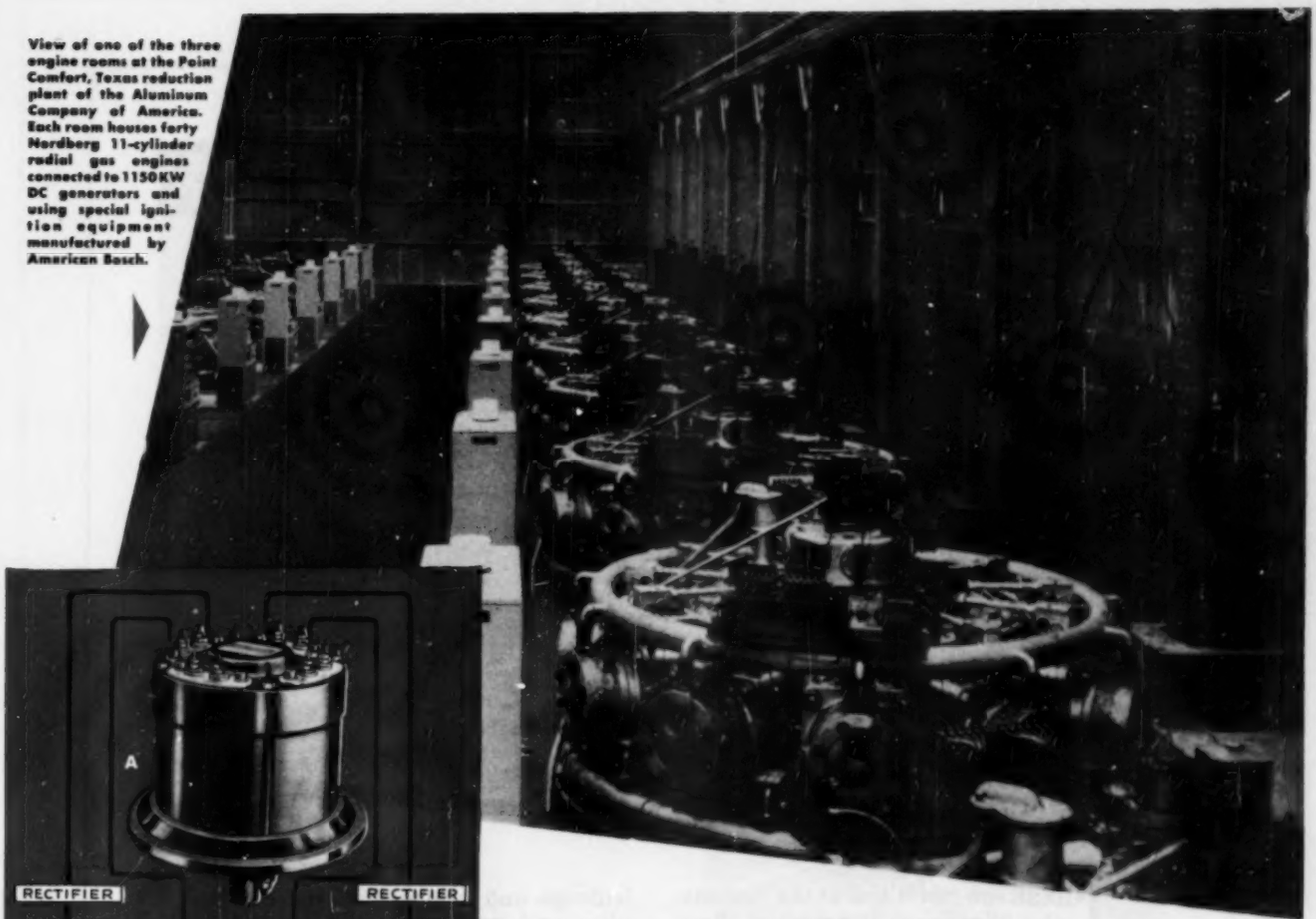
In the extensive line of Manzel Force Feed Lubricators there is a model to meet *your* needs. For the best in lubrication always call on . . .

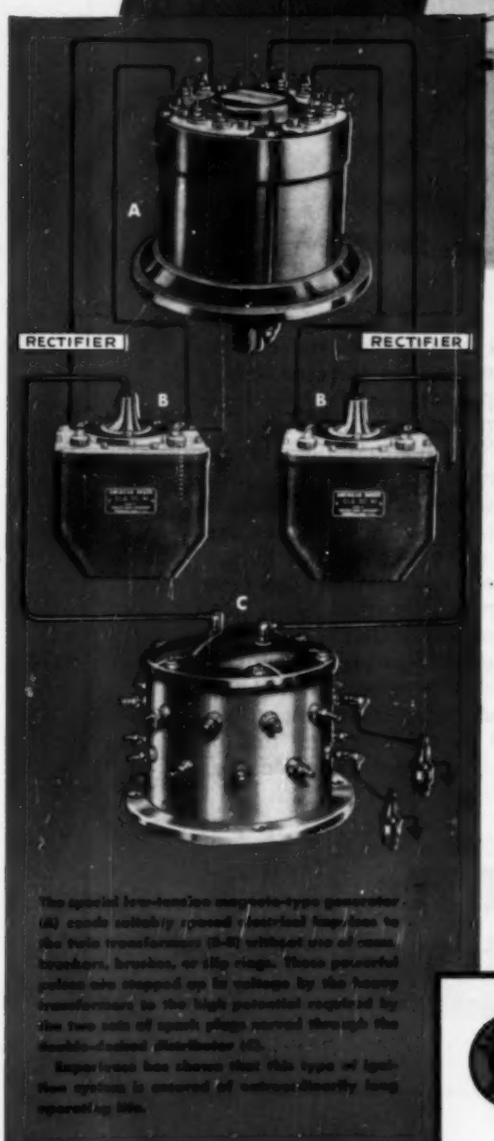
*Page 46

Manzel

DIVISION OF
FRONTIER INDUSTRIES, Inc.
275 BABCOCK STREET, BUFFALO, N. Y.

View of one of the three engine rooms at the Point Comfort, Texas reduction plant of the Aluminum Company of America. Each room houses forty Nordberg 11-cylinder radial gas engines connected to 1150KW DC generators and using special ignition equipment manufactured by American Bosch.





A Notable Advancement *in Ignition*

The unusual ignition equipment for this magnificent installation was developed and perfected by American Bosch for Nordberg, from initial designs by Alcoa based on wartime experience in similar plants.

Largest independent producer of Diesel fuel injection equipment in the United States, American Bosch has always produced electrical ignition equipment too . . . is constantly working to develop new ideas in either field that will advance the internal combustion engine.

The engineering knowledge and manufacturing ability required to develop and produce equipment such as that shown here are reflected in every product that bears the name American Bosch.

American Bosch

Dependable Fuel Injection for the Diesel Industry

AMERICAN BOSCH CORPORATION, SPRINGFIELD 7, MASS.

Magnetos · Generators · Voltage Regulators · Ignition Coils · Electric Windshield Wipers · Diesel Fuel Injection Equipment

WALWORTH LUBRICATED PLUG VALVES

offer these advantages

- . . . Direct port opening
- . . . Quarter turn opens or closes valve
- . . . Dead tight shut-off
- . . . Freedom from attack by fluids being handled
- . . . Pressure sealed
- . . . Made in a complete line. Sizes from ½" to 24" for pressures from 175 to 5,000 psi., and for vacuum requirements

THESE are just a few of the reasons why Walworth Lubricated Plug Valves give "top" performance on many *difficult* services.

All Walworth Lubricated Plug Valves employ special insoluble lubricants which protect the plug and body against contact with the line fluid, thus combatting erosion and corrosion.

The lapped surfaces of the valve are "pressure sealed" when the valve is in either the open or closed position. By turning the lubricant screw, lubricant is forced under high pressure through a grooving system that completely encircles the ports as well as the top and bottom of the plug.

The lubricant seals the valve against leakage, and reduces friction between plug and body. This permits easy, quick, full-opening, or tight shut-off with only a quarter turn of the plug.

Number 1700 (illustrated) is a Steel-iron valve, wrench operated, designed for a working pressure of 200 pounds WOG (water, oil, or gas). Valves are available in either screwed or flange types. Screwed type have API line pipe thread lengths. Flanged type (No. 1700F) is faced and drilled to American Standard for 125-pound cast iron flanges unless otherwise specified.

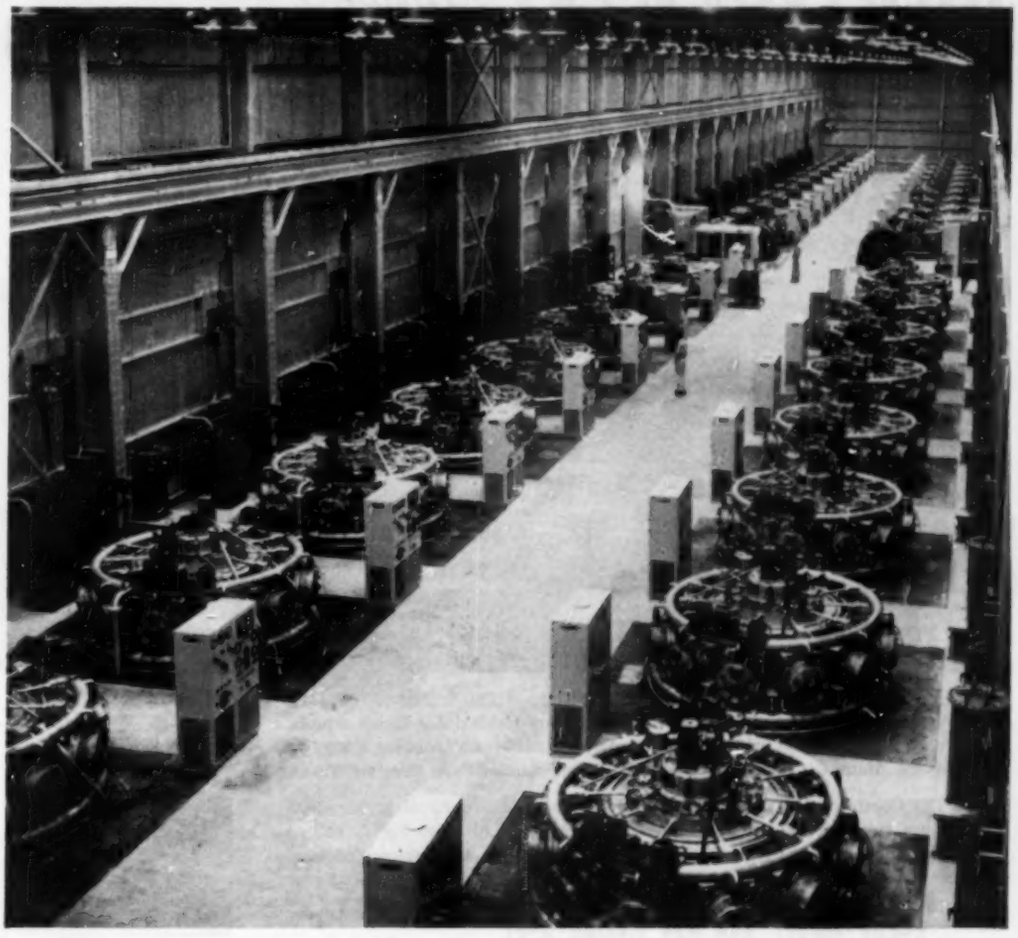
For further information about No. 1700 as well as the complete line of Walworth Lubricated Plug Valves, write for catalog.

WALWORTH

valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD



SEALED POWER PISTON RINGS are used exclusively in the new Point Comfort, Texas plant of the Aluminum Company of America. This is the world's largest gas engine plant, developing 192,000 horsepower from 120 radial type Nordberg engines. The above photograph shows one of the three lines of 40 engines each.

SEALED POWER CORPORATION
MUSKEGON, MICHIGAN

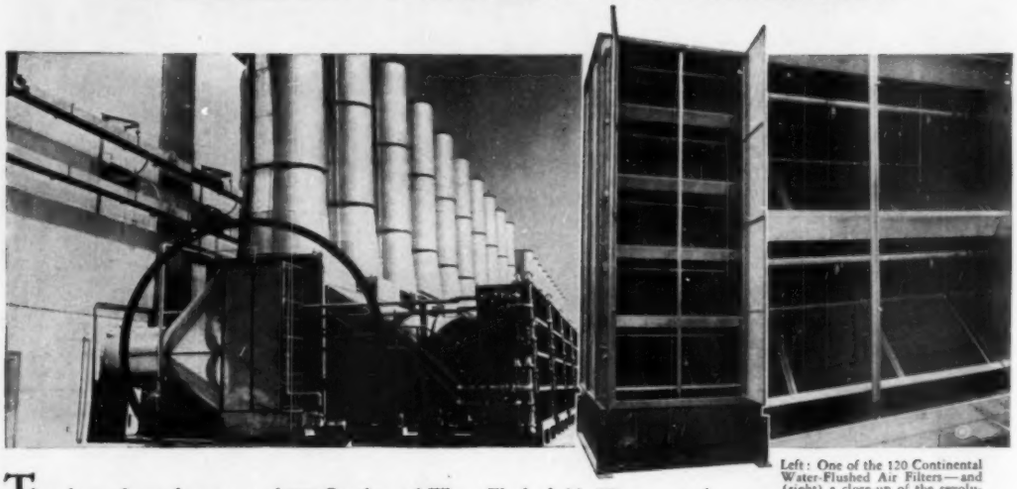
Sealed Power

PISTON RINGS · PISTONS
CYLINDER SLEEVES

CONTINENTAL *Water-Flushed* AIR FILTERS

clean 4,200,000 CFM *for*

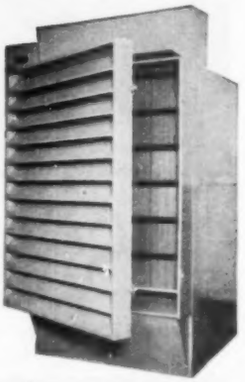
ALUMINUM COMPANY of AMERICA!



Left: One of the 120 Continental Water-Flushed Air Filters—and (right) a close-up of the revolutionary "Ezwash" cells.

The photo above shows one of 120 Continental Water-Flushed Air Filters—probably the largest installation of such equipment ever made—now handling 4,200,000 CFM for the Aluminum Company of America power plant at Point Comfort, Texas.

These 120 Continental Water-Flushed Air Filters have a capacity of 35,000 CFM each. They clean all the air for this giant plant—for 120 1,600 HP Nordberg radial gas engines, as well as for all electrical ventilation and comfort cooling.



An 11,000 CFM Continental Automatic Self-Cleaning Air Filter—one of 29—used on Cooper-Bessemer GMV-10 Gas engine-driven Compressors by Transcontinental Gas Pipe Line Corp., at Stockridge, Ga.

3 PROVEN TYPES OF AIR FILTERS, FOR EVERY DIESEL AND GAS ENGINE USE!

In addition to its outstanding Water-Flushed Air Filters, Continental offers two other unique and advanced types of air cleaners:

The Continental Automatic Self-Cleaning Air Filter;
The Whirlwind Oil-Bath Air Cleaner.

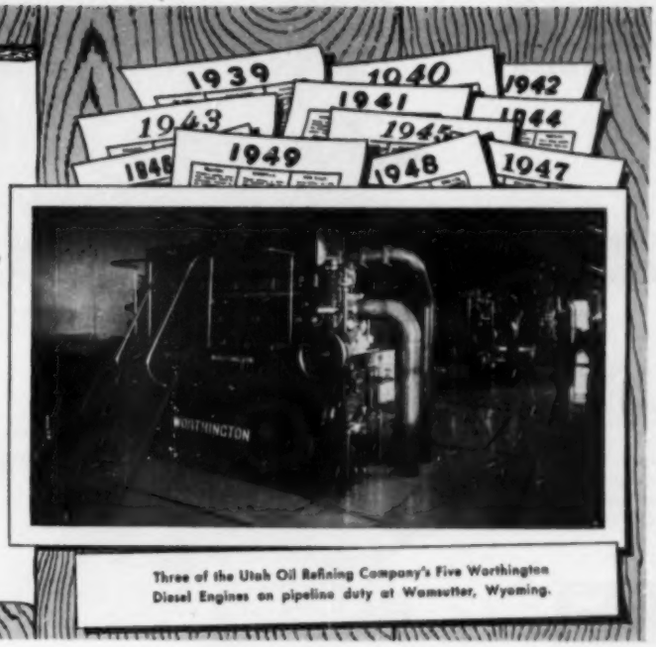
All three are generally conceded to be the most highly-developed equipment in their respective fields. Each utilizes revolutionary new air-cleaning principles which have resulted from two decades of intensive experience in air-filtration for engines and compressors. We urge you to send for complete descriptive bulletins and data. No obligation of any sort, of course.

Five Continental Oil Bath Air Cleaners, on 1,000 HP Worthington Gas engine-driven Compressors of Tennessee Gas Transmission Co. at Monroe, La.

CONTINENTAL AIR FILTERS, Inc.

Post Office Box 1647, Louisville, Kentucky

Ten years of trouble-free operation ...on crude oil fuel!



Three of the Utah Oil Refining Company's Five Worthington Diesel Engines on pipeline duty at Wamsutter, Wyoming.

Worthington Diesels Require Only Routine Monthly Inspection For Continuous Top Performance

How well can a Diesel engine perform on crude oil fuel? For an action-proved answer, consider the Worthington Diesels at the Wamsutter, Wyoming, pumping station of the Utah Oil Refining Co. Located near the crest of the Continental Divide, the plant pumps crude oil (daily maximum: over 40,000 bbls) from sources in Colorado to points east and west.

Five Worthington Diesels, ranging from 250 to 820 hp, are used. Two were installed late in 1939; the others in 1946, 1947 and 1949. *All burn crude oil of 32° gravity.*

High altitude and harsh winters make operating conditions severe, yet the two oldest Worthingtons — until after ten years and nearly 50,000 hours each of steady duty — *had never had their pistons pulled or valves ground.* And the other three give every indication of equalling this long, trouble-free record!

MORE EXAMPLES

Wherever oil is moved through pipelines, Worthington Diesels are serving. Latest Worthington supercharged and atmospheric Diesels are successfully burning crude oil from lines stretching across Texas. Almost half a century of experience with every type of crude oil fuel has provided a sound background for assured customer satisfaction with modern Worthington Diesels.

Crude oils, Diesel oil, some residue oils, natural gas, producer gas — all are successfully fueling modern Worthington Diesels and spark ignition engines — in almost every type of power service. For further facts proving *there's more worth in Worthington*, write to *Worthington Pump and Machinery Corporation, Engine Division, Buffalo, New York.*

WORTHINGTON

E.O.4

YOUR PARTNER IN POWER PROGRESS

WORTHINGTON-BUILT AUXILIARIES

Diesel engines, 150 to 3,520 hp . . . gas engines, 175 to 3,520 hp . . . dual fuel engines, 225 to 3,290 hp.

Balanced Angle Compressors

Oil Transfer Pumps

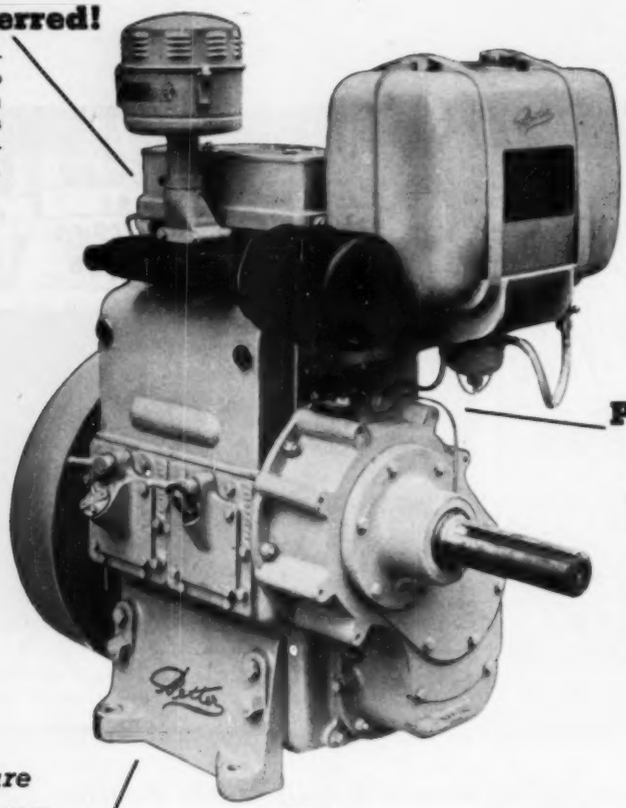
Cooling Water Circulating Pumps

Evaporative Type Engine Water Cooler

When you compare cost...

Petter is Preferred!

Petter Diesels at pound-devalued prices are *30% to 40% lower in cost.* Now you can purchase world-famous Petter Diesels at prices comparable to gasoline engines.



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"The General Motors engine operated very satisfactorily at all times," writes Captain Allen. "In 30 years' Diesel experience, the engine on the 'Mary M' is the only one I have seen that performed 6000 to 7000 miles requiring no attention other than changing oil and filters. On arrival at San Diego, no service was needed beyond checking valve clearance and injector timing.

"Fuel consumption for all purposes was 8 gallons per hour cruising at 10 knots. Lube oil consumption was very low as we did not add any oil between changes at 200 hours. The engine maneuverability was very satisfactory—it could not have performed any better."

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CONVERSION OF DIESELSHIP NORTH STAR

$700,000 spent in converting a Maritime Commission freighter to a combination passenger and cargo vessel.

By MIKE CLARY

HOW a C1-M-AV1 freighter may be transformed into a well appointed combination passenger and cargo vessel is demonstrated in the conversion job done on the diesel ship *North Star*, formerly the *Coastal Rider* of the Maritime Commission, by Todd Shipyards Corporation, Seattle, at a cost of approximately $700,000. The changes were necessary in order to fit the ship for carrying passengers, freight, and for providing hospital and medical facilities for isolated villages visited on voyages as far north as Point Barrow, on the Bering Sea, and Wainwright, on the Arctic Ocean, for the Alaska Native Service, Department of Interior. Although changes provided quarters for only 32 passengers, in addition to a 16-bed hospital, it is the opinion of Carl J. Nordstrom, Seattle consulting naval architect, who planned the work, that the same general idea in conversion could be carried out for a much larger passenger list. To do so would mean extending the poop forward to the foremast and installing a tier or two of midship deck houses, for which Nordstrom says stability is ample. He added that such a conversion, with the navigating bridge moved forward, would make a very handy general purpose combination cargo and passenger ship, suitable for a number of trades.

Work on the *North Star*, which included complete overhauling of the 1,700-hp. Lima-Hamilton diesel engine, was done in two stages. The vessel entered drydock at Todd's in May, 1949, and in July was withdrawn to make a voyage to Point Barrow with the season's supplies. Entering drydock again in November, the conversion was completed in time for the ship to return to service in March, 1950, completely restyled. The two-cycle, single acting, solid injection Lima-Hamilton diesel operates at 180 rpm., turning out 1,700 shaft hp., and provides a cruising speed of about 12 knots. The engine has a continuous rating of 1,870 hp. at 186 rpm. and a 2-hour overload rating of 2,125 hp. at 194 rpm. Thomas Murphy, Seattle representative for the engine manufacturer, supervised the overhaul work, which included some parts replacements. Murphy's chief task was to reduce the cylinder compression and fire pressure. The former had been allowed to run abnormally high, about 595 pounds, and Murphy brought that down to the engine builder's specifications of between 500 and 550, with fire pressure between 700 and 750. Dock trials at 135 rpm. indicated those goals were reached when compression stood at a low of 450 and a high of 460, with fire pressure between 695

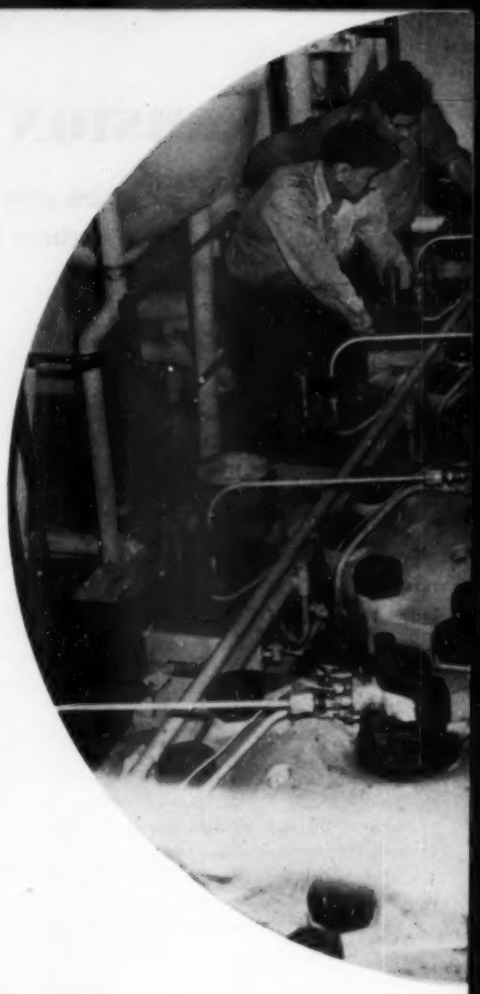
Shown here is the *North Star*, which at a cost of $700,000 was converted from a C1-M-AV1 Maritime Commission freighter to a combined passenger and freight vessel. The ship is powered with a six-cylinder Hamilton diesel engine, giving it an estimated speed of 12 knots.

and 710. The reductions were attained by reducing the thickness of the one-piece liner between connecting rods and crank pin box. The maximum drop was 135 thousandths and the minimum 80 thousandths. Compression was checked with a Cooko gauge.

The engine was designed to burn 16 Baume fuel, but when the vessel was operated under the Maritime Commission as the *Coastal Rider*, 36 and 37 gravity oil was burned. It will now use 22 Baume. Fuel consumption is .40 lb. per shaft horsepower and the ship has a fuel carrying capacity of 115,655 gallons. The Lima-Hamilton diesel has a bore and stroke of 21½x27½ inches. The piston speed is 825 rpm. The engine is equipped with a unit fuel ignition system, and is fresh water cooled. The engine overhaul work included pulling all pistons and skinning out and truing up the two top ring grooves. The oil cooling space was tested to 100 pounds pressure and the cylinder lubricating system was cleaned and tested to 1,000 pounds pressure. All water space around the cylinder blocks, and lines, were tested to 650 pounds pressure. The six fuel pumps all were overhauled. The engine is equipped with a centrifugal oil purifier. The only new item added to the engine room during the conversion work was a new bilge pump, driven by a 15-hp. electric motor. This pump has a 5-inch suction and a 4-inch discharge, with a capacity of 400 gpm. The ship's electric power plant consists of two generator sets. These engines have a bore and stroke of 12x15 inches and turn up 450 hp. One of the generating units is capable of carrying the vessel's power load.

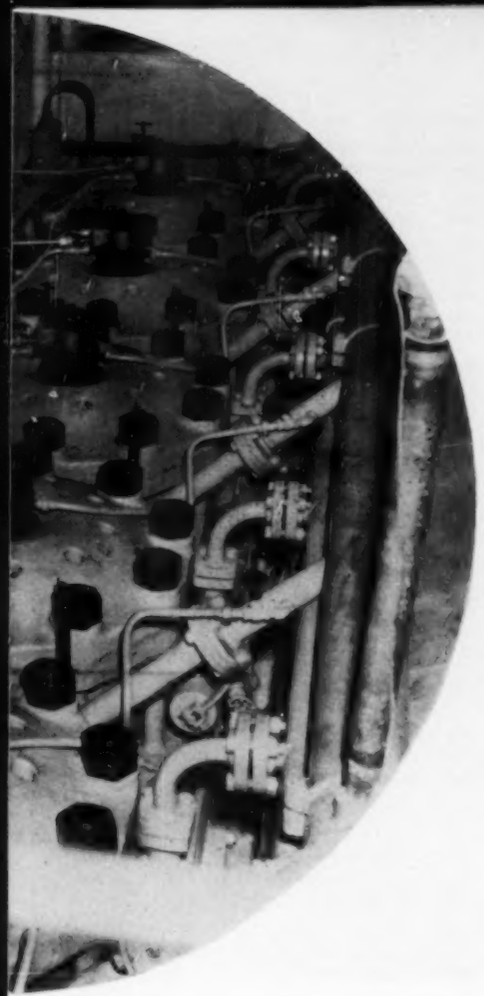
Since the 338-foot steel-hulled vessel, which has a beam of 50 feet and a moulded depth of 29 feet, often must travel through surface ice and floes on its voyages north, the bow was strengthened with doubling plates, intermediate frames and stem and forefoot reinforcement. The half-inch plates were welded over the original plates and extend from the bow to the turn of the bilge. Also, since it is frequently necessary to clear water intakes of ice in slushy seas, steam connections were provided to all sea chests. Space for 32 cabin passengers, 16 hospital beds, nurses' quarters, laboratory and x-ray facilities, was provided above the main deck from amidships aft. For that reason, little change was made in cargo carrying capacity, save that the area for deck loads was reduced by about one-third. Covered space for the accommodations was provided by extending the poop forward from frame 104 to a little forward of amidships. The new construction was all forward of the navigating bridge, which remained virtually unchanged. The extended poop deck formed a pleasant promenade area, much of which is sheltered by an extension of the boat deck to carry two additional life boats.

The dining saloon was installed just forward of existing crew's quarters, which were rearranged generally to provide for service space and addi-

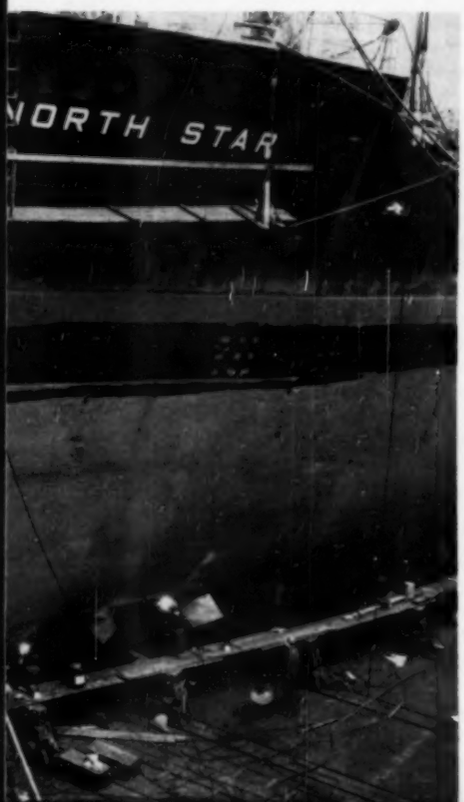


Carl J. Nordstrom, right, Seattle naval architect who designed the conversion work, is shown in the social hall of the ship with V. R. Farrell, administrative assistant and special representative of the Alaska Native Service.

To prevent damage to the bow while navigating through surface ice and ice floes in the Bering Sea, the bow was strengthened with half-inch doubling plates which extend to the turn of the bilge, and by intermediate frames, stem and forefoot reinforcement.



Looking over the completely overhauled Hamilton diesel engine in the *North Star* are Peter B. Olsen, third assistant engineer, and Charles Gimblett, oiler. Normal operation calls for 180 rpm., which will turn up 1,700 shaft horsepower.

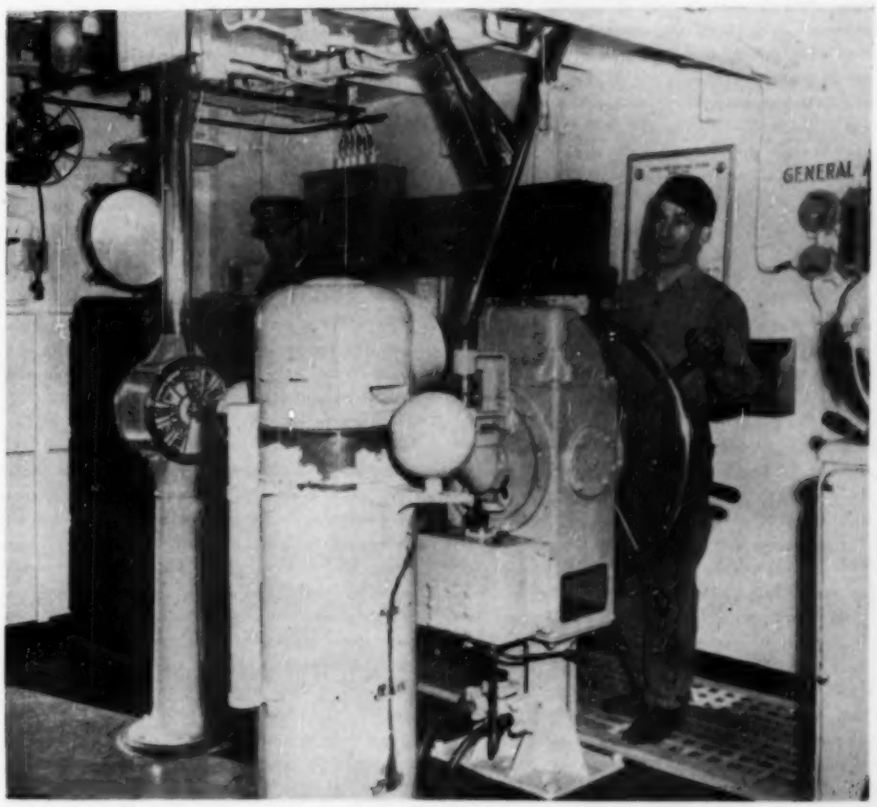


tional personnel. The vessel carries a crew of 43. A roomy and luxurious day lounge in a steel deck house was fitted directly above the saloon space, which was provided by reducing the length of No. 3 cargo hatch, trunked up through the accommodations. In arranging the accommodations on the main deck, an interesting structural problem presented itself, since the original design of the ship was such that No. 3 'tween deck and hold were virtually free of pillars, with long span girders above the main deck forming the coamings of No. 3 cargo hatch. Since these long hatch coamings had to be removed, the entire structural support of the main deck and the new superstructure above it had to be completely redesigned, using shorter span girders and pipe pillars in the holds. These were so arranged that interference with stowage of cargo is minor, yet the vessel's hull is well stiffened and supported throughout the area.

In order to care for the added hotel load, a pantry was fitted to serve the main dining room and equipped with an electric range of large capacity. Additional store spaces were provided, notably in way of old cargo hatch No. 4, which was suppressed. All food service is on one deck, thus eliminating dumbwaiters and stairway travel for mess attendants. The former cargo cold storage space was moved from hold No. 4 to the forward end of hold No. 3, and the old area became space for additional potable water stowage in four tanks, built into the space separate from the hull. These tanks give the ship a fresh water capacity of 76,000 gallons. The refrigerating machinery was retained in its No. 4 hold position, but was repiped to the new hold. The cold space is utilized for transportation of frozen reindeer carcasses southward. Conversion work resulted in less top hamper and cleaner lines to the vessel, what with removal of the two king posts and their cargo booms forward of the bridge and the king posts and booms serving hatch No. 4. Although the mainmast is rigged virtually as before it is eight feet higher due to construction work on the main deck. No changes were made in the forward rigging, or in hatches Nos. 1 and 2. The *North Star* has a bale capacity of 217,275 cf. and a deadweight capacity of 5,670 tons to the cargo line.

Since the ship must transfer cargo and passengers at stops in the far north where no port facilities of any port exist, a steel lighter and a towing launch are carried on deck to serve that dual purpose. The 30-foot cabin launch is powered with a diesel. The new *North Star*, equipped with such modern navigational aids as radar and automatic pilot, along with ship-shore radio system, stands in strange contrast to the old wooden *North Star* which plied northern waters for many years. That venerable ship, which served the Navy on Greenland patrol during World War II, was the supply ship for the Byrd expedition to the South Polar Seas shortly prior to the war. Aside from providing the Alaska Native Service with comfortable passenger service and freight carrying ability, this diesel-powered ship represents an accomplishment in conversion from freighter to a dual-purpose diesel vessel.

Capt. Charles H. Salenjus, left, is shown at the ship's Sperry radar, while an able seaman stands his watch at the wheel.



DIESELS MAKE POTASH IN UTAH

Bonneville Limited Uses Vapor Phase Cooled Worthington Diesel For Power Generation and Heating

By E. J. WATTS

APPROXIMATELY 125 miles west of Salt Lake City and just east of the town of Wendover, Utah, is the potash producing plant of Bonneville Limited. In pre-historic times most of the northern part of the State of Utah was covered by Lake Bonneville. It has been estimated that the lake covered an area of 19,750 square miles. Its main body was in the present Salt Lake Valley, Rush and Tooele Valleys, and the Great Salt Lake Desert. Geologists have determined the lake found its outlet at Red Rock in the northern part of the State, thence flowed to the Pacific Ocean. The lake finally withdrew to the area now occupied by Great Salt Lake and the Great Salt Lake Desert. Part of this area, when the water evaporated, became what is now known as the Salt Flats. The salt deposition varies in thickness from less than an inch to several feet. The flats carry a residual salt brine containing large amounts of sodium chloride salts and smaller amounts of potassium and magnesium chloride salts. It is the potassium chloride content that Bonneville Limited recovers. Aside from the commercial aspect of recovering potash from the Salt Flats, the area has gained world-wide fame as the site of the world's fastest speedway. Immediately to the northeast of the Bonneville Limited plant is the 14-mile straight track through which the measured mile is run. On September 16, 1947, John Cobb established an official automobile speed record of 394.196 mph. Ab Jenkins, of Salt Lake City, broke all world speed and endurance records, except the measured mile, in his Mormon Meteor III on these same Salt Flats.

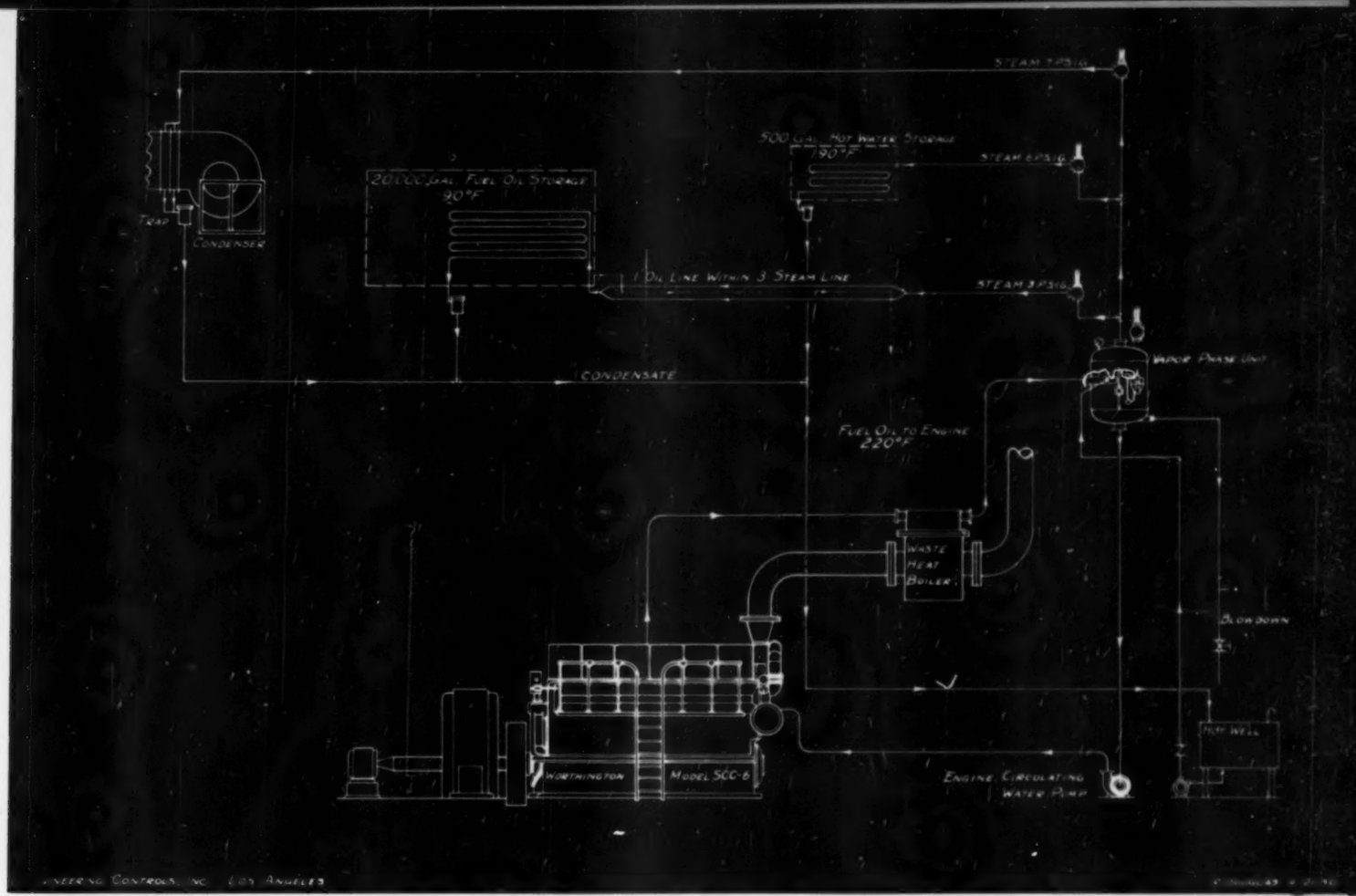
During World War I a plant was built on the Bonneville Salt Flats where brine was collected and potash recovered. As long as high prices prevailed, the operation was successful. When the demand for potash diminished the plant soon closed. The closing of the plant, however, did not affect the interest of those who believed potash could be profitably recovered from the brine. In 1935 Bonneville Limited was formed and a concentrated effort was made to recover potash profitably. From a small pilot plant Bonneville Limited has grown to a modern plant producing approximately 70,000 tons of commercial grade potash annually. From extensive evaporating ponds, the crude salts are harvested and hauled to the mill in trucks, where the potash is recovered by flotation. The potassium chloride is floated and the sodium chloride is removed as tailings. The process is involved and entails a combination of chemical, metallurgical and mechanical engineering.

Since there is no public utility power source available at this remote plant, and because prime movers were required to operate the pilot mill, several small high speed diesel engines were installed, some on direct mechanical drive and others connected to generators from which small electric motors and lights were operated. As more equipment was added, new engines were added. Finally, late in 1948, the management decided to consolidate the power generating facilities into a main unit. A study of the requirements was made and a Worthington 10¾-inch bore by 14½-inch stroke, four-cycle Buchi-turbocharged diesel engine operating at 450 rpm. and rated 489 hp. at 4,250 ft. elevation above sea level, was purchased. The engine is direct connected to a 420-kva., 336-kw., three wire open 2,300-volt three-phase, 60-cycle Electric Machinery engine type generator, altitude rated. The generator is at the present time connected for 480 volts. Since fresh water is scarce at this plant, the management was interested in a type of engine cooling system which would require a minimum quantity of make-up water. After extensive study, and because the standard Worthington diesel engine could be used, the decision was made to install a vapor phase cooling system, utilizing the steam generated by engine for space and water heating.

Underlying the salt is a layer of surface clay about three feet thick and below is an area composed of joint clay. Since this is unstable ground, the engine foundation was designed to rest on twenty-eight piles each 40 feet long. This arrangement had been successfully used in the foundation of the ball mill. Because there were no facilities at the plant to unload the approximately 25-ton engine from the railroad flat car it was loaded on a trailer in Salt Lake City and hauled 125 miles to the site. The building housing the engine, generator, switchboard and all auxiliaries is 20 feet wide, 40 feet long and 14 feet 6 inches to the roof trusses. Sufficient piles were driven into the ground adjacent to the present engine foundation to allow for plant expansion without interfering with the present operation. Immediately to the east of the power plant building is an elevated horizontal 20,000-gal. capacity, insulated fuel storage tank equipped with steam heating coils. This tank is sufficiently elevated to permit gravity flow of fuel to the engine. Since the area is subjected to salt dust storms, the building is maintained under positive air pressure, when necessary, by means of two squirrel cage type blowers each driven by a 2-hp. electric motor.

Because of the high jacket water temperature with vapor phase cooling, a separate source of cooling was required for the engine lubricating oil and for cooling the turbocharger. As previously mentioned, fresh water at the plant is at a premium, but a supply of weak brine which is pumped from a canal several hundred feet from the mill by a Worthington Monobloc pump, to the tailings disposal in the mill, was available. This line passes within 102 feet of the power plant. A 4-inch line was tapped into the main line and run to the engine room, where a 1-hp. pump boosts the brine through a special lubricating oil cooler. The brine out of the cooler discharges through a 4-inch line to the tailings disposal. Thus all the brine originally intended for the tailings disposal is brought to this point. In series with the brine side of the lubricating oil cooler is a small special heat exchanger used for cooling the fresh water in the turbocharger cooling water circuit. A ⅓-hp. pump circulates approximately 8 gpm. in this circuit to maintain proper turbocharger temperature.

The primary equipment in this type of cooling system is a steel tank with a built-in steam separator and sedimentation chamber (vapor phase unit) where the water is flashed into steam, a circulating jacket water pump, and a condenser. In this installation, in order to generate the maximum quantity of steam, an exhaust gas boiler is installed in the engine exhaust line and the circulating water out of the engine passes through the waste heat boiler on its way to the vapor phase unit. The engine cooling and steam heating cycle of this installation operates as follows: A 5-hp. motor driven centrifugal pump takes its suction from the bottom of the v-p. unit and discharges into the jacket water inlet manifold of the engine. The water travels through the engine and out of the discharge manifold to the waste heat boiler, where additional heat is added, and thence to the v-p. unit where, due to a reduction of pressure because of the location of the v-p. unit with respect to the engine, part of the water is flashed into steam. Installed on the v-p. unit are two back pressure relief valves, one set at 3-lb. gauge, the second at 6-lb. gauge. The discharge of the lower pressure setting relief valve goes to the 20,000-gal. fuel oil storage tank where the steam is condensed in heating and maintaining the fuel oil at 90°F. The condensate is trapped through a float and thermostatic trap and returns by gravity to a hot well in the power house. The discharge from the back pressure valve set at 6 lbs. supplies steam to a 500-gal.insulated hot water storage heater equipped with immersion type steam coil. The temperature of the storage tank is maintained at 190°F. by means of a thermostatically controlled regulating valve which admits steam to the tank as required. The excess steam not required by the water heater is then delivered to an air condenser. The fan on the air condenser is driven by a 7½-hp. motor and has a capacity of 15,700 cfm. with ¾-inch water static pressure available at the coil discharge. The discharge air is then directed into an insulated sheet metal duct system on the roof of the mill (located in this manner because space was not available inside the mill) whence the heated air is delivered to the mill. The inlet air to the fan is taken from the mill proper, and the fan plenum



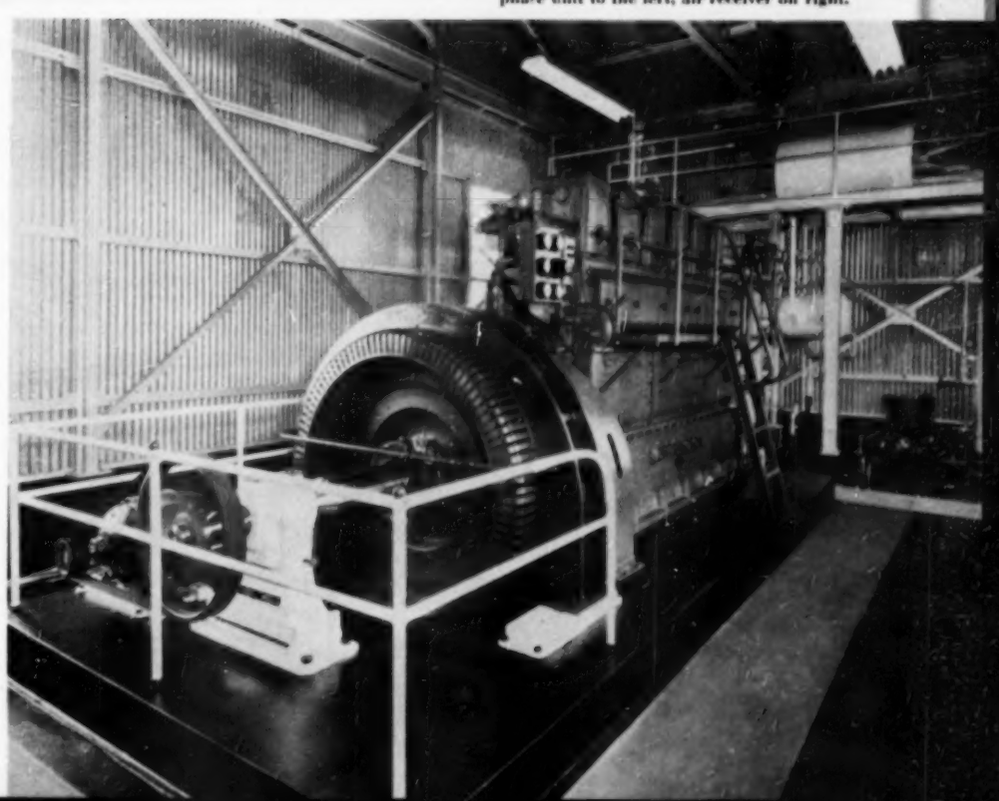
Schematic drawing showing the hook-up of both the waste heat boiler and the vapor phase unit at Bonneville Limited, Wendover, Utah.

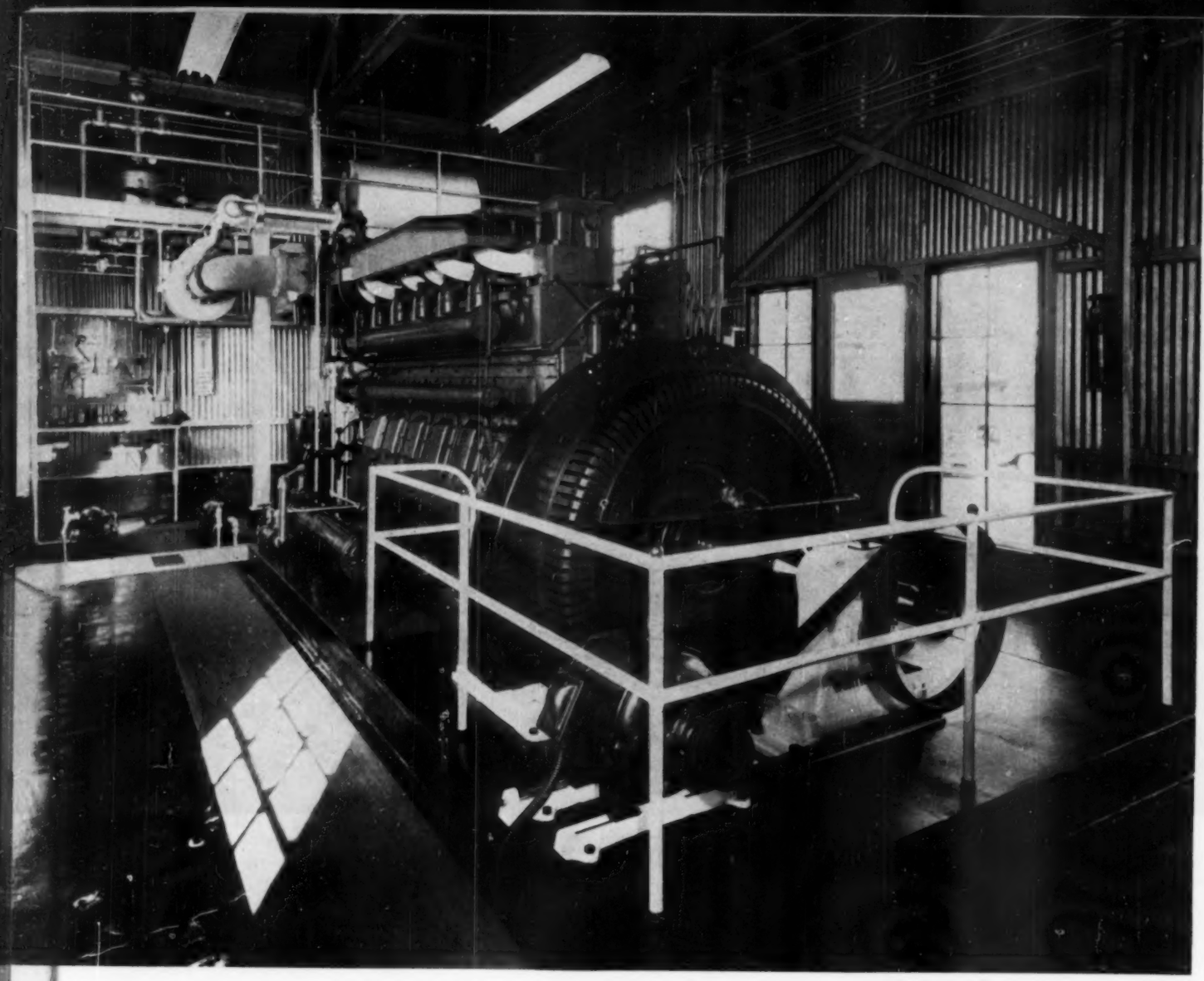
chamber is equipped with motor operated face and by-pass dampers, actuated by a modulating type thermostat located in the mill, for temperature control. The condensate from the hot water storage tank and the air condenser is returned through float and thermostatic traps to the hot well. A float operated switch on the v-p. unit operates a pump which takes its suction from the hot well and delivers water to the v-p. unit to maintain the water level within predetermined limits.

Alongside the hot water storage tank is a 20-gal. fresh water make-up tank which supplies make-up water, by gravity, to the system as it is required. From the foregoing it is thus seen that all the steam generated by the engine is used, and all the condensate returned to the hot well to be re-used. The table, found elsewhere in this report, shows the pounds of steam generated per hour versus per cent engine load. The total fresh water make-up to this system averages five to six gallons in 24 hours. We believe this is one of the first installations of its kind in the United States where a diesel engine electric generating power plant, involving a sizeable slow speed engine, was designed for using the available steam from a vapor phase system in such a diversified way.

At the present time, the connected load to the Worthington engine consists of: (a) Box car loader and sampler located about a mile and a half from the power plant. There is a total of 24 hp. in four motors, 14 hp. operating continuously and 10 hp. intermittently. (b) A dryer driven by a 75-hp.

Interior view of Bonneville Limited power plant showing Electric Machinery generator, Worthington Diesel. Day tank is on the mezzanine, vapor phase unit to the left, air receiver on right.





Another interior view of the Worthington diesel installation at Bonneville Limited, Wendover, Utah, showing vapor phase unit in left background, lube oil cooler and turbocharger cooler on platform beside engine.

General view of plant, evaporating ponds in background. U. S. Highway 40-50 and Western Pacific Railroad tracks are also shown. Offices are to right of silo-type storage bin. Machine shop to left of storage bin, mill proper in foreground.

motor. (c) A vacuum pump driven by a 40-hp. motor. (d) Ball mill driven by a 30-hp. motor. (e) Hammer mill driven by a 15-hp. motor. (f) Two Worthington chemical pumps each driven by a 15-hp. motor. (g) 20-hp. motor driving a 3-drum tugger hoist. (h) Miscellaneous motors ranging in size from 5 to 15 hp. (i) Lighting and miscellaneous power for the mill, boarding house, offices, machine shop and warehouse.

Prior to the installation of the new engine, the dryer, vacuum pump and ball mill were each direct driven by a small high speed diesel engine, and in addition, four high speed diesel engines were operated for auxiliary power generation. The load on the new engine is practically constant, the only noticeable variation is attributed to the tugger hoist. The new engine was placed in operation about September 1, 1949, and has been run continuously since that time except for a three-day plant shut-down over the Christmas holidays, downtime to change lubricating oil, and several miscellaneous shut-downs for minor adjustments usually encountered when starting up a new installation. The engine has been running continuously since the latter part of January, when the last oil change was made.

Table "A" is a tabulation of the kilowatt hours generated versus fuel consumed from October, 1949, to March 27, 1950.

This performance, and the fact that all the steam generated has been used, indicates that more than 73 per cent of the heat equivalent of the fuel consumed has been put to useful work.

Since early in November, 1949, the engine has been running on a low cost fuel oil with the following characteristics:

Cetane No.	62
Gravity A.P.I.	30-32
Flash Point, Degrees Fahrenheit	350
Pour Point, Degrees Fahrenheit	55
Viscosity S.S.U. at 100 Degrees Fahrenheit	55
Carbon Residue, Per Cent	0.1
Sulphur Less Than, Per Cent	0.2
High Heating Value, Btu. per Gal.	141,000

The high pour point of this fuel oil requires that the storage tank be heated. This is taken care of by steam from the vapor phase heating system. A 3-inch steam line supplies the coils in the storage tank and the 1-inch fuel oil line to the engine is run concentric within the steam line, thus delivering the fuel oil to the engine at approximately 220°F. From all indications, this fuel is performing satisfactorily. This plant uses Texaco Ursa straight mineral lubricating oil blended with Algol to maintain a viscosity of 750 to 800 SSU at 100°F. The blend is made at the plant. At the end of the first 500 hours operation, the lubricating oil was changed. At the end of 2,500 hours operation (2,000 hours after the first change) the oil was again changed. The analysis of the used lubricating oil at each change was as follows:

	500 Hours	2,000 Hours
Appearance	Clear, red, blue bloom	Black
Odor	Used	Used
Water, per cent	None	None
Gravity A.P.I.	19.2	19.1
Flash COC °F.	395	405
Fire COC °F.	465	480
Vis SU at 100°F	922	896
Free Carbon, Per Cent	.02	.05
Neutralization No.	.018	.3
Ash, Per Cent	Trace	Trace

Based on the above performance the oil supplier recommends that the lubricating oil be run for approximately 3,000 hours before the next change. It has been the practice to change the lubricating oil filter every 500 hours. The consumption of lubricating oil by the engine averages 3 gallons per 24 hours, which is equivalent to 4,320 sea level rated horsepower hours per gallon.

When operating at a load of 300 kw. the following temperature readings were observed: (1) Inlet jacket water temperature to engine–220°F. (2) Outlet jacket water temperature from engine–225°F. (3) Turbocharger cooling water temperature–98°F. (4) Lubricating oil cooling water inlet temp. (Brine)–53°F. (5) Lubricating oil temperature to engine–132°F. (6) Lubricating oil temperature from engine–152°F. A plant operating log is maintained, and readings are recorded hourly by one of the mill operators. Maintenance is performed by the maintenance department under the supervision of Jesse Ecton, Mechanical Supt. The engine is protected with complete electric alarms and shut down devices for low water and oil pressure, high water and oil temperature, and overspeed shut down.

Lockwood W. Ferris, Vice President and General Manager, is responsible for most of the development work at Bonneville Limited. We extend our thanks to him for permission to run this article. Blair Lamus, Plant Superintendent, has been most cooperative and helpful at all times. Jesse Ecton, Mechanical Superintendent, supplied us with the operating data presented herein and we extend our thanks to him for his wholehearted cooperation.

Table A

Month	*Kilowatt Hours Generated*	*Fuel Oil Consumed Gallons*	*Kilowatt Hours per Gallon of Fuel Oil*
October, 1949	147,700	10,636	13.88
November, 1949	145,200	10,100	14.39
December, 1949	165,400	11,348	14.59
January, 1950	179,200	12,719	14.10
February, 1950	169,700	11,878	14.30
to March 27, 1950	164,700	11,569	14.25
	971,900	68,250	14.25 average

Computation of Thermal Efficiency

Total hours from October to March 27, 1950		4,272
Less down time		120
Actual operating hours		4,152
Average load over period	$\frac{971{,}900 \text{ kw. hours}}{4{,}152 \text{ hours}} =$	234 kw.
Steam generated @ 234 kw. load (69.6% of engine rating)		990 lbs./hr.
Latent heat of steam at 6 lbs. gauge and 4,300 ft. above sea level		963 Btu's/lb.
Total latent heat in steam put to useful work	990 lbs. × 963 =	954,000 Btu's/hr.
Heat equivalent of kw. hrs.	234 × 3,413 =	798,000 Btu's/hr.
		1,752,000 Btu's/hr.
Less heat equivalent used for auxiliaries	15 kw. × 3,413 =	51,200 Btu's/hr.
Kw. generated plus heat recovered		1,700,800 Btu's/hr.
Total Btu equivalent of fuel consumed per hour:	$\frac{234}{14.25} \times$ 141,000 Btu/gal. =	2,320,000 Btu's/hr.

Overall thermal efficiency of engine-generator

$$\frac{1{,}700{,}800}{2{,}320{,}000} = 73.5\%$$

List of Equipment

Diesel Engine–Worthington Pump & Machinery.
Generator–Electric Machinery Mfg. Co.
Switchboard–Electric Machinery Mfg. Co.
Vapor Phase Cooling System–Engineering Controls.
Lubricating Oil Filter–U. S. Hoffman.
All Pumps; Air Starting Compressors, Both Engine and Motor Driven–Worthington.
Lubricating Oil–The Texas Co.
Fuel Oil–Western States Refining Co.

NEW DIESEL RAILCAR

New York Central is the first to put the "Beeliners" into commuter service out of Boston to Springfield, starting a new era in railroad economy.

By CHARLES F. A. MANN

MAY DAY may mean upheaval to the bone-headed politicos throughout the world, but to the New York Central Railroad and the ride-happy suburbanites on the Boston-Springfield Line of its New England subsidiary, the Boston & Albany Railroad, it meant the inauguration of the world's first regular diesel railcar passenger service. Known as the "Beeliners," the service began on the 98-mile stretch through snooty Boston suburbs with twin stainless steel dual diesel engined cars seating 89 passengers in air conditioned bliss and with safe speeds up to 83 miles per hour, not to mention the fact that Budd disc braking will remove the entire bridgework with one easy swoosh from every passenger, without sound, jerk or jar, so effectively does this newest Budd idea operate on lightweight coaches in commuter service!

As we mentioned, some knotheads may visualize a world revolution of violence, but May Day on the dear old Central, which packs the world's largest daily load of long-haul commuters, was a revolution in railroad passenger operation. Long ago, before World War I, when the distillate burning engine came down in size and weight enough to squeeze inside a passenger car, the railroads junked steam local trains and tried various versions of a gas-electric or gas-mechanical drive rail car, with sad results. The old distillate engines with hot bulbs, make and break ignition, clumsy, inefficient heating systems, silly electric units and old heavyweight car construction, were a poor substitute for powerful locomotives and rattly old coaches. So it died. It died because nobody believed that a full mechanically sound power plant could ever be designed to operate a single rail car dependably.

But from its roots, Electro Motive sired from the ruins the diesel locomotive, which today is sweeping the whole railroad world, and got so busy developing it that everybody forgot the potentialities of low-cost, light weight, fast, very comfortable individual rail cars using the dependable diesel—especially just before and during the late war. Now an associate of Electro Motive—Detroit Diesel

—teamed with America's great innovator in railway cars, the Budd Mfg. Co. of Philadelphia, and Frigidaire, plus Allison, have produced the first complete version of what a rail car ought to be. The experimental model, by Budd, known as RDC-1—Rail Diesel Car No. 1—was announced last winter, and after transcontinental tests, it, with three variations as to inside arrangements, speedily brought firm production orders to Budd. The second revolution in railroading is on! The first was the diesel locomotive. The second will either eliminate the nation's annual passenger train deficit, or turn it into profit. And who knows but what it may win friends and influence among weary motorists who can't go along with $2,500 "low priced cars" and $25 monthly parking bills, in competition with 2½ cents per mile diesel rail car commuter fares that lets them sleep, smoke, read and gossip while going to and from the green hills of suburbia to the smog of the downtown office.

Briefly, RDC-1, the original, is built like a subway car, of heavy welded stainless steel, 85 feet long, of standard inside dimensions, with simple subway-type electric controls behind a thin steel door at each end so that it controls like a street car; headlights and horns and marker lights at either end. It weighs 112,800 lbs. ready to run, and is designed to run singly or in multiple unit up to 150 cars if needed, for branch or mainline work. A slight variation for mail and baggage space and fewer than the 90-passenger normal capacity is provided for railroads needing these facilities.

The cars are beautiful, compact, simple and cozy inside, make use of waste heat from the power plant jacket water and diesel exhausts, and have full air conditioning systems provided by a seven-ton Frigidaire unit driven by a motor fed off the diesel electric power plant. A neat arrangement of thermostatically controlled valves keeps the diesel engine jacket water circuits delicately balanced to provide inside car heat and jacket water cooling from roof mounted radiators in the summer time.

The power plants consist of twin Detroit Diesel GM 2-cycle 6-cylinder diesels, mounted at a low angle to the crankshaft, on roll-out trays, one at each end of the car, and driving one pair of wheels at the inner ends of the two four-wheel trucks, via an Allison-built torque converter transmission, essentially a combined torque converter and fluid drive that locks itself into direct drive when the car gets up to moderate speeds. Two sets of constant mesh helical gears are employed for reversing, or operating continuously in either direction. The twin diesels develop their rated power at 1,800 rpm. and are rubber mounted in an aluminum housing. Engine cooling radiators and water tankage for washing and toilets are roof mounted, reached via two thin diaphragm-type uptakes in the center of the car. A 10-kw. auxiliary generator is fitted to each diesel for lights and air conditioning, and full automotive type controls and accessories are compactly fitted into each operating cab space, including deadman's control. A 284-amp. battery set is carried for safety lighting and engine starting. The engine jacket water system is an elaborate piece of engineering, cooling not only the engine jacket, but the heat exchanger and lube oil circuits, then automatically warming the car body, and if any excess heat is present, on to the roof mounted radiators, all automatically regulated at each heat transfer point. A steamline for hooking up outside steam in cold weather automatically keeps the engine cooling water circuit at 150 degrees.

The Budd disc brakes with Rolokrom anti-slip control bring a high rate of deceleration at all speeds. Tests show the loaded car will reach 62 miles per hour speed in 120 seconds, and attain 57 miles speed at the end of the first mile. It will run 42 miles per hour up a 2 per cent grade and operate most efficiently at 70 miles per hour. A whole railroad train packed into a single 85-foot car!

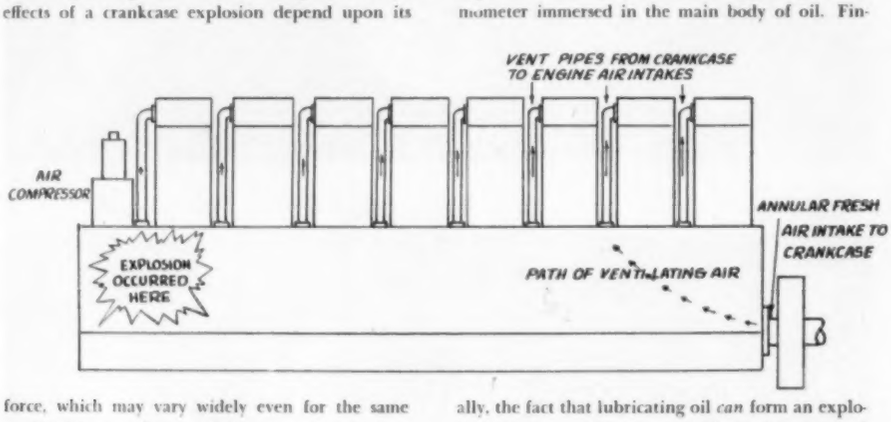
Having the distinction of being the first operator of these new cars in regular service, the Boston & Albany twin "Beeliners" will operate a total of 800 miles daily, making two round trips between Boston and Springfield. They will cover the 98 miles in two hours, making five stops. At an investment of $283,00, the price of a 2-unit diesel locomotive, the Central has cut the investment in two complete trains from about $600,000 down to $285,000 and provides the same service to its customers! Just where the RDC Budd diesel car idea will stop is anybody's guess. Night runs with these cars made into sleepers, with another coach-mail-baggage car; whole transcontinental runs; dead branchlines revived; marginal commuter traffic put back into the black; service expanded to win traffic back from the highways. Where it will stop nobody knows. . . . Some say it will boom in the next depression when everybody is forced off the highways by high costs. Hmmm!

LET'S VENTILATE DIESEL ENGINE CRANKCASES

By EDGAR J. KATES*

CRANKCASE explosions of diesel engines are a type of accident that fortunately is extremely rare, considering the vast number of engines in use. Nevertheless, every possible preventative measure should be taken, because a crankcase explosion can be disastrous, not only as regards damage to the equipment but more important, as to personal injury and even loss of life. As in an airplane crash, it is small comfort to the victim that the chance of this happening to him was less than one in a million. Despite the importance of the subject it is not surprising that few details of actual crankcase explosions have ever been made public. The manufacturer of the engine involved fears that such information might be used against him by his competitors, while the owner is often restrained for legal reasons. And so it behooves all users of diesel engines to know the causes of crankcase explosions and the precautions that may be taken against them.

What is a crankcase explosion? It is the instantaneous combustion of inflammable vapor enclosed in the engine crankcase. Two unrelated circumstances must precede a crankcase explosion: (a) the existence of an explosive mixture; (b) a spark or other high temperature source to ignite it. The effects of a crankcase explosion depend upon its force, which may vary widely even for the same engine, because of several influences. Among these are: (a) the fuel/oxygen ratio of the vapor mixture; (b) the temperature of the mixture; (c) the quantity of explosive mixture present. A weak explosion may cause only a puff through the crankcase breathers. A heavier one may blow off one or more crankcase covers and emit a blast of flame. A still heavier explosion may blow apart the crankcase itself. What constitutes the explosive mixture? The oxygen constituent is found, of course, in the air normally in the crankcase. The oxygen content may be less than that of pure air (21%) because of the admixture of spent gases blown past the rings from the combustion chambers, but even the spent gases contain more than 12% oxygen.


VENT PIPES FROM CRANKCASE TO ENGINE AIR INTAKES
AIR COMPRESSOR
ANNULAR FRESH AIR INTAKE TO CRANKCASE
EXPLOSION OCCURRED HERE
PATH OF VENTILATING AIR

The fuel constituent of the explosive mixture may have various sources. It may be lubricating oil, either in the form of true vapor evaporated from the body of hot lubricating oil in the crankcase or in the form of droplets produced by the oil sprayed from the ends of the bearings. It may also be fuel oil which either has blown past the piston rings or has leaked into the crankcase from a broken supply pipe or a defective drain connection. It may even be the vapor of an inflammable cleaning fluid, such as kerosene or gasoline, which has not been thoroughly wiped and blown out of the crankcase. Let's consider flash points a moment. The flash point of an oil is the temperature to which it must be heated to drive off sufficient vapor to flash when exposed to a flame. Since the flash point of lubricating oil is about 375°F., which is far higher than the temperature of the oil as shown by thermometers in the oil circulating line, one might conclude that lubricating oil cannot produce an explosive mixture. Such a conclusion would be erroneous for several reasons. In the first place the flash point of oil in the form of droplets is undoubtedly much lower than in the form of a massive body of oil in a laboratory flash-point tester. Secondly, the temperature of the droplets or vapor is much higher than that shown by a thermometer immersed in the main body of oil. Finally, the fact that lubricating oil *can* form an explosive mixture has been conclusively demonstrated by the occurrence of crankcase explosions when no other burnable material was present.

Obviously, since lubricating oil will burn in the crankcase, still greater hazards are presented by fuel oil, kerosene and gasoline, which have progressively lower flash points. Gasoline evaporates at room temperatures; kerosene can be ignited if heated to about 130°F. Gasoline should therefore never be used for cleaning. If kerosene is used, extreme care should be taken to wipe it out of all pockets before the engine is started. Light fuel oil (which can be ignited if heated to 160-180°F.) is somewhat safer than kerosene, but should also be wiped out thoroughly, as pockets can easily be heated to this temperature. It is well known that mixtures of gases and air are inflammable only between two extreme limits. For example, a mixture of methane and air containing less than 5.5% or more than 12.8% methane will not explode. The limit of inflammability is about 30% methane; a mixture between this proportion and explosibility burns quietly. The rate of flame speed and consequently the explosive power is greatest when the proportion of methane is about 9.5%. For gaseous mixtures in general, the rate of flame speed is greatest when the mixture is somewhat richer than that required for complete combustion, i.e., the "combining proportions."

Little definite information is available regarding the explosive mixture range of oil vapor and air. But even if the figrures were known for a particular set of circumstances they would not be of much value in avoiding crankcase explosions because the explosibility limits will vary according to the composition and size of the oil droplets and the oxygen content of the "air" in the crankcase. The important fact to know is that crankcase mixtures do have explosibility limits. That a crankcase mixture can be too lean to ignite is an obvious deduction; where there's no fuel there can be no fire. It is also demonstrated by the fact that although hundreds of diesel engines have thrown sparks or hot metal into their crankcases soon after starting, explosions did not result. Obviously not enough oil vapor to support combustion had accumulated. On the other hand, the fact that a crankcase mixture can be too rich to explode has been proven by the circumstances of several crankcase accidents. Each of these accidents was characterized by the fact that a heavy explosion occurred after an access opening had been uncovered, permitting additional air to enter the crankcase. In some cases the operator was removing a crankcase cover to investigate a mechanical fault such as a burned out bearing. The ignition source was present in the form of hot metal or a slow fire but the oil-air mixture was so rich that it did not explode until the opening into the crankcase admitted enough additional air to lean the mixture enough to make it explosive. In certain other such cases, the trouble started by itself when a crankcase cover was pushed out by a weak explosion which had been produced by the ignition of a highly rich mixture. But after the cover was pushed out, a second and major explosion took place due to the entry of additional air. The probable sequence of events in these cases of double explosions was as follows:

(1) Enough oil vapor formed to produce a highly rich, slowly explosive mixture.

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*Consulting Engineer, New York.

(2) The mixture was ignited by sparks or hot abraded metal.

(3) A weak explosion puff pushed open one or more crankcase covers. The explosion puff consumed most of the available oxygen but left slow-burning pockets. The resulting heat produced more oil vapor (which did not burn for lack of oxygen).

(4) Pressure within the crankcase fell below atmospheric because much of the gaseous contents had been expelled and the remainder cooled and contracted.

(5) Air from the engine room blew back into the crankcase in large amounts through the open cover, met the unburned oil vapors and formed highly-explosive mixture.

(6) Second ignition occurred from still-hot abraded metal or from still-burning pockets of over-rich mixture.

(7) Severe second explosion occurred.

How then shall we guard against crankcase explosions? The entire crankcase enclosure cannot be made strong enough to withstand the pressure for several reasons, among which are the huge amount of surface exposed to the pressure and the need for lightness of the crankcase access doors so that they may be readily handled.

Neither will it suffice to make the crankcase covers so weak that they will blow out and relieve the pressure on the main structure. The hazard to the operator would still remain, since even the lightest plate flying through the air could maim or kill a man and furthermore the flash of flame might burn him. No the only safe way to guard against crankcase explosions is to prevent them. How can this be done? We have seen that a crankcase explosion occurs when a spark or some abraded metal ignites an explosive mixture. As for the spark or hot metal, we unfortunately cannot preclude such occasional mechanical derangements like piston blowby, piston seizure or over-heated bearings. Potential ignitors therefore cannot be avoided. So we must eliminate the explosive mixture. Since the oil vapor is bound to be present, the only recourse is to keep the mixture ratio safely outside of the explosive range. Here there are two schools of thought among engine designers: (a) those who believe in sealed crankcases and over-rich mixtures, and (b) those who want ventilated crankcases and over-lean mixtures. The proponents of the sealed crankcase pin their faith on always keeping the mixture too rich to propagate a flame. They say: (a) Don't supply any air to the crankcase, either by forced draft or by leakage around the crankshaft seals. (b) Wait several minutes after a shutdown before removing a crankcase cover. (c) Use explosion relief doors of the non-return type which will prevent inrush of air after the pressure of a minor explosion has been relieved.

What do they do about breathers? Some form of crankcase breather is necessary because of piston blowby and, in the case of engines of few cylinders, because of unsymmetrical motion of the pistons. Breather practices differ among the advocates of sealed crankcases. One group uses a simple breather with or without baffles, which is open to the atmosphere. The other group draws out the excess gases in the crankcase by connecting the crankcase to a suction source of some kind such as the intake manifold on 4-cycle engines, the scavenging blower inlet on two-cycle engines or the inlet of a separate suction blower. Such suction connections are advantageous in that they prevent the discharge of the excess gases into the engine room and also, by putting the crankcase under a slight vacuum, they reduce oil seepage through the crankcase joints.

The other school of thought, in which this writer finds himself, believes in ventilating the crankcase so thoroughly that the vapor mixture will never be rich enough to ignite. These engineers believe that there is an inherent fallacy in the contention that "the oil vapor and air mixture in a totally enclosed housing is normally too rich to ignite or propagate a flame." How about the period immediately following the starting of the engine? The crankcase is cool, and there is little, if any, lubricating oil vapor present. Obviously, as the engine continues to run and the amount of oil vapor increases, the mixture must pass through the explosive range before it reaches the over-rich condition upon which the sealed crankcase advocates rely. But this initial running period is just the time when mechanical derangements may occur and sparks may fly. Thus we have present all the factors which may cause a severe crankcase explosion! Another hazard exists in the sealed crankcase design. Suppose the seal becomes less perfect than the designer intended, because of unexpected air leakage, as through a crankshaft seal or through a loose cover-plate gasket? If a suction type of breather is being used it is quite possible to draw enough air through the crankcase to keep the vapor mixture continuously within the explosive range, so that it will go off whenever anything happens to ignite it. Nor should too much reliance be placed in the non-return explosion relief doors used by some designers of sealed crankcases in order to avoid the severe secondary explosions which they envision. Such valves will no doubt serve their purpose if the precise condition prevails for which the valves were designed, namely a mixture whose ratio at the time of ignition happens to be just at the upper explosive limit and therefore produces only a weak explosion puff which pushes open the relief valves without damaging them. But if the mixture ratio happens to be leaner than this the relief valves may be blown open with such force that they will fail to close afterwards, and the feared second explosion is likely to occur.

The conclusion to be drawn from all of this, in the writer's opinion, is that instead of sealing crankcases tightly in order to try to produce an over-rich mixture, they should be thoroughly ventilated so that the mixture will always be too lean to ignite. Good ventilation would also serve to cool the crankcase contents and thus further reduce ignitibility. If we pass enough air through all parts of the crankcase, the oil vapor will be drawn out practically as fast as it forms,, and what is left will be so little in comparison with the air present, that the mixture ratio and temperature will be well below the lean explosive limit, and in fact cannot even be ignited. But the ventilation must be thorough. Past experience has shown that the common forms of suction devices previously mentioned will draw enough air through the crankcase to keep the mixture non-explosive if there are large enough inlets into the crankcase and if these inlets are correctly located. For small four-cycle engines the simple arrangement shown in Figure 1 has proven satisfactory. Here the air enters the crankcase through a large breather as well as around the crankshaft at one end, and is drawn out at the opposite end through a baffled vent pipe connected to the engine air intake manifold. Thus the ventilating air traverses the entire crankcase. Unfortunately some designs of "ventilated" crankcases have been defective in that the air inlets have been too small, too few or in the wrong places. Merely drawing a vacuum on the crankcase is not ventilating it. Figure 2 shows schematically an example of a defective design which permitted a serious crankcase explosion in an eight-cylinder air-injection marine engine. The engine was equipped with eight vent pipes leading from the crankcase to the individual cylinder air intakes, thus affording ample means for withdrawing the crankcase vapor if air had been permitted to enter the crankcase at points well distributed along its 30-foot length. But the only place where air could enter the crankcase was a small annular space ¼-inch to ½-inch wide surrounding the crankshaft at the flywheel end. Such fresh air as entered the crankcase at this point nat-

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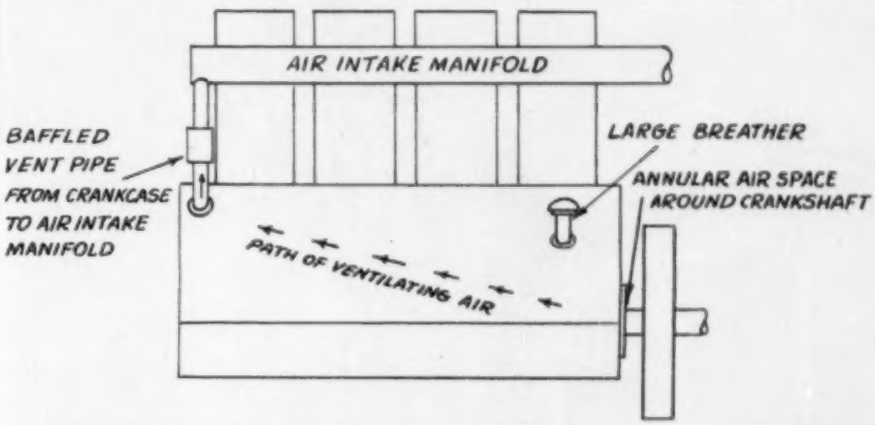
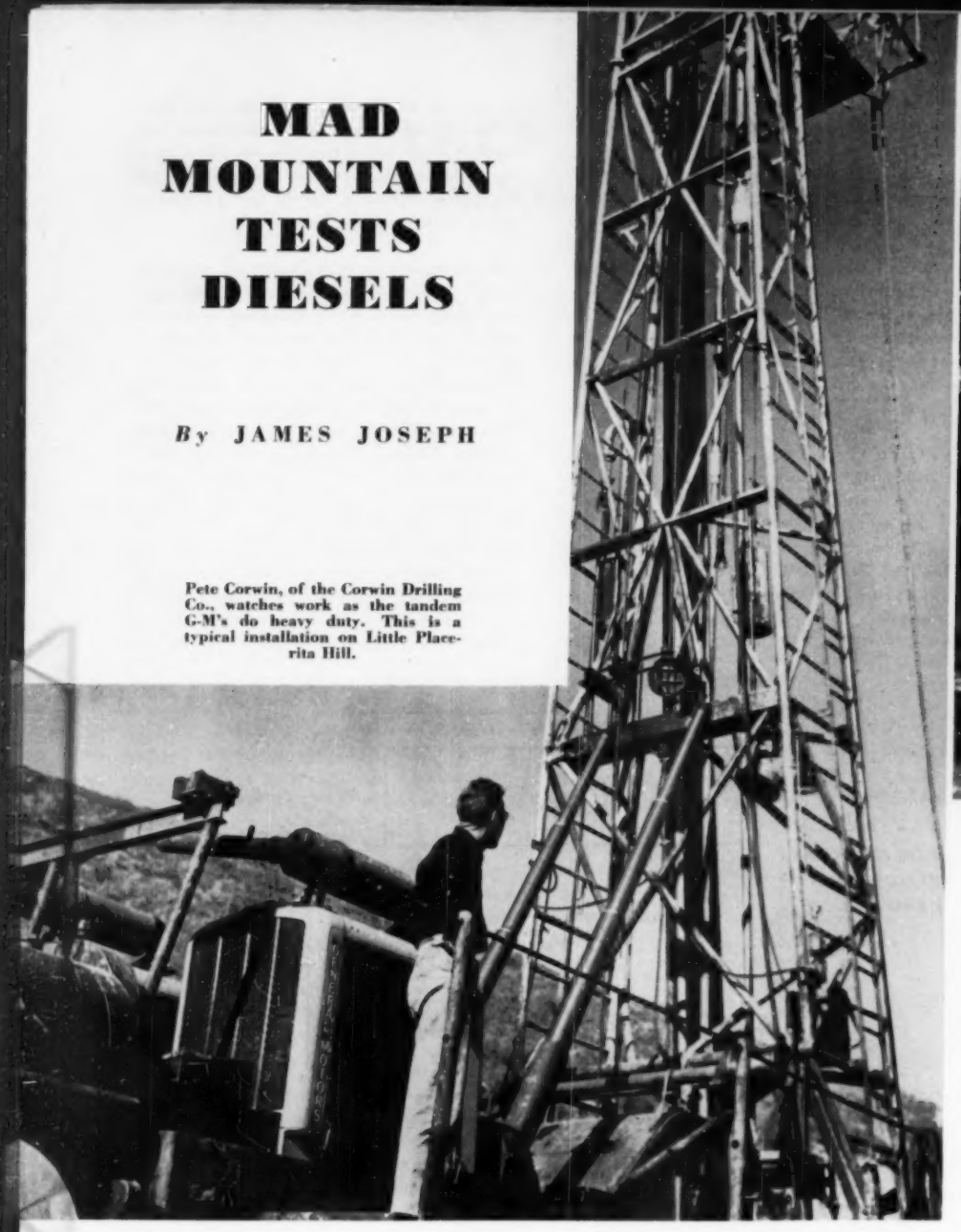

AIR INTAKE MANIFOLD
BAFFLED VENT PIPE FROM CRANKCASE TO AIR INTAKE MANIFOLD
LARGE BREATHER
ANNULAR AIR SPACE AROUND CRANKSHAFT
PATH OF VENTILATING AIR

MAD MOUNTAIN TESTS DIESELS

By JAMES JOSEPH



Pete Corwin, of the Corwin Drilling Co., watches work as the tandem G-M's do heavy duty. This is a typical installation on Little Placerita Hill.

Little Placerita Hill—studded with oil rigs—became a mad mountain inside of a few weeks in March of 1949.

PLACERITA hilltop—the little hill that oil made a "mad mountain" as gold did a century before, is also a diesel story. It all began during the first week in March—last year—when a gusher struck by wildcat promoter Milfred R. Yant disturbed the pleasant hilltop near Newhall, California. The first well, a little less than 1,800 feet deep, produced 1,200 barrels a day. Subsequent wells flowed 2,500 barrels—and higher. Promoters rushed in, bought land wildly. A tenth of an acre—part of the 80-acre hilltop—was enough for a portable diesel rig. Wells were sunk in eight days—some in four or five and paid for themselves in less than a week. That's where the diesel trucks came in—hundreds of them. At times 180 trucks swarmed over the hill, mired down in the muck, were pulled free, and churned up and down the hill again. Meanwhile, as trucks came and went, portable diesel rigs arrived. At times there were 25 diesel rigs drilling simultaneously. Oldtimers who should know say never did confusion reign so unbridled. Yet some hard practical diesel facts came out of all the confusion.

One driller, for instance, sunk his first well fifteen months ago, using a portable Sullivan 300 A, backed up by tandem GMC diesel engines—both 3-cylinder and 75-hp. It is now fifteen months later and the driller—Pete Corwin, Corwin Drilling Co.—has a chance to evaluate his diesel equipment. An old timer at drilling, Corwin says: "I've never seen a rig take such punishment. For six straight months our diesels never even got cold." Using one rig—and its two diesels—Corwin has sunk 61 wells, almost half of the hill's total 181 holes. Since fifteen months ago, his diesels have run almost day and night. Typical operation was 22 hours a day without let-up. Sometimes the diesels would stop only between shifts, fifteen minutes, four times a day for grease, oil, and check-up. So far, Corwin has had to make but two repairs—both injectors, and he's averaged one well every week. Both diesels have been running 24 hours on but about $15.00 worth of diesel fuel. And the load has been heavy—using a 65-foot tower.

But even Corwin agrees that the most spectacular thing about Placerita hilltop was its diesel tankers—which served as pipeline until only recently, when General Petroleum hooked in a short section from the hill to its main feeders between Bakersfield and its Long Beach refinery. One drilling company alone, Rothschild Oil Co., ran 35 tandem tankers, 5,500-gallon capacity, on shuttle runs between its wells at Placerita and its refineries at Santa Fe Springs—some 60 miles distance, a six-hour round trip. This company, an independent, is still shuttling 25 trucks. At peak production, tankers moved 10,000 barrels a day off Rothschild holdings—130 barrels to a load—ninety round trips daily by tankers. At peak, Rothschild ran fifty diesel rigs off "confusion hill." Gravity flow loading docks—nothing more than extended pipe growing out of the unpaved and sandy rut-road, could fill six trucks simultaneously. The average loading operation for tandem trailers required but 30 minutes. Each rig usually made three to four trips a day, round the clock.

With 181 wells producing, most of them drilled by portable diesel equipment, an estimated 4,000,000 barrels have been hauled by truck-tanker. Of the tanker and equipment hauling rigs put into service by the approximate eight drilling companies squatting, fighting, squabbling over the oil pool, about 90 per cent were powered by Cummins engines—the HR 165 hp. being most common, with 150's and

Day after day and night after night this diesel equipped rig kept drilling on one of the two by four bases on Little Placerita Hill.

200-hp. rigs next in line. Of the remaining oil company rigs—both gas and diesel—there were GMC and units powered by Hall-Scott engines. Among haulers—most of them diesel equipped—were Allen Tank Lines, Asbury Transportation Co., Crosley Transport, Evans Tank Line, Mercury Transportation, Newhall Refining Co., Oil Transport, Roberts Tank Line, Slauson Tank Lines and Webster Trucking Co.

Local diesel mechanics in Newhall—swamped by tankers which had bogged down and busted something—put it this way, "it wasn't the diesel equipment that went wrong most often." The motors seemed to take it better than the trucks themselves. Sometimes tanker line-ups, waiting for new roads to be bulldozered as leases cut exits and entrances, reached a mile down the highway. At one time, sixty tankers waited for bulldozers to open roads—an 11-hour vigil. Atop the mechanized hill, there were no diesel shops, no repair facilities. Mobile crews with repair shops on wheels waited along the perimeter of the hill—like birds of prey, prepared for inevitable breakdowns. Strangely enough, there weren't many. Said one disappointed crewman, "never saw diesels grind away like this—with only occasional injection trouble. That's about all." Meanwhile, tanks are still rumbling up the grades, in one of the biggest, most dieselized operations in the West—some say, maybe anywhere.

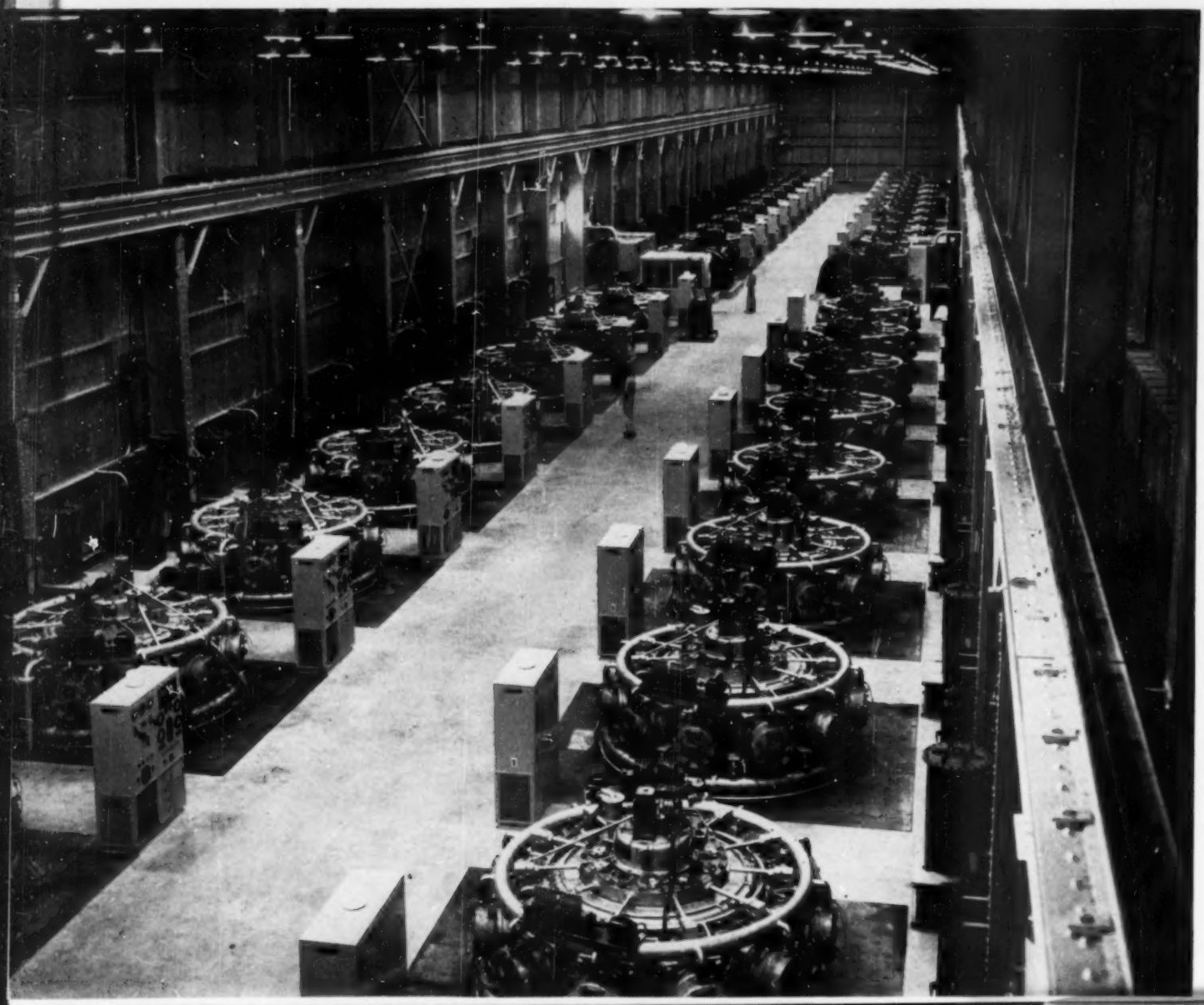
Just a few of the trucks in the daily line-up hauling oil from Little Placerita Hill picking oil up from each lease as it brought in a new well.

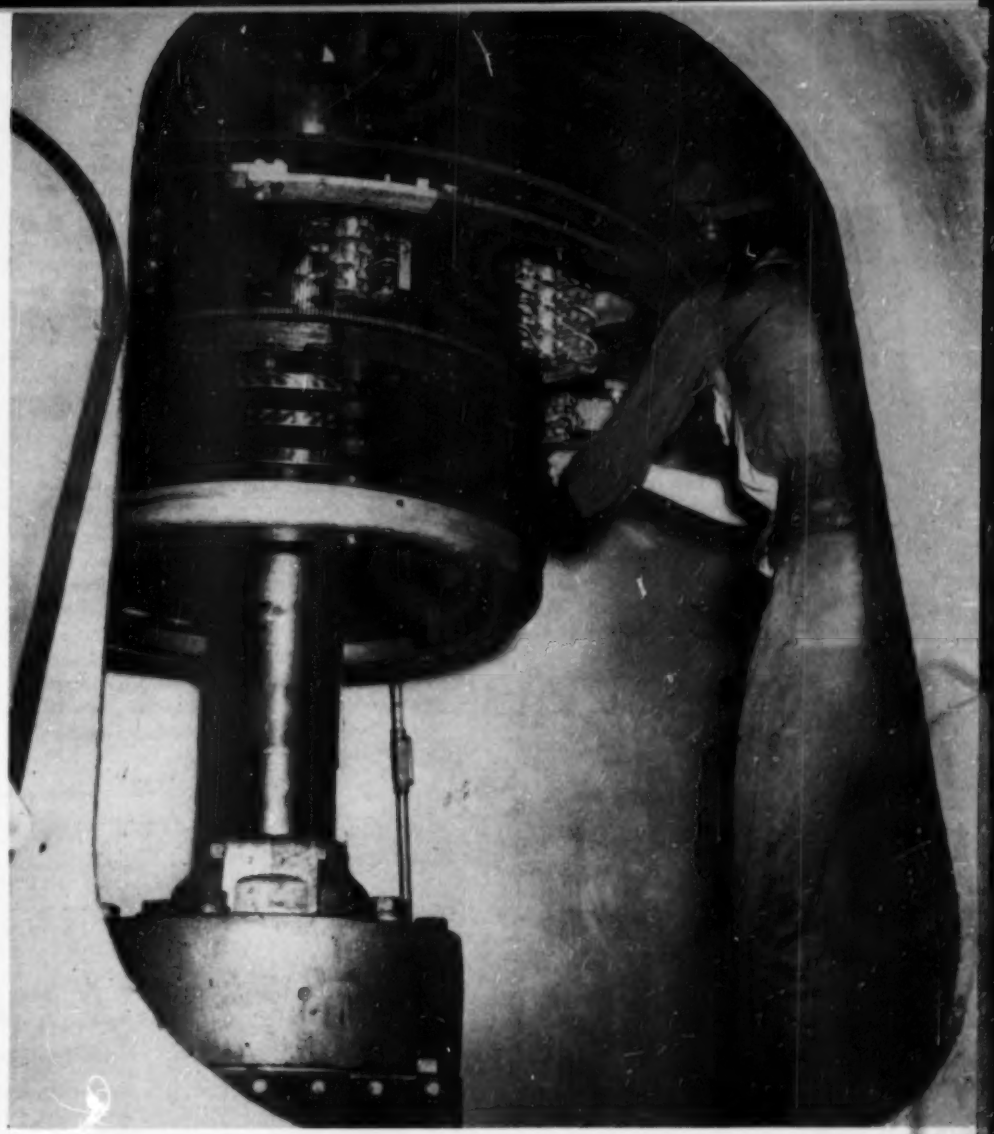
ALUMINUM CO. OF AMERICA POINT COMFORT, TEX. WORKS

192,000 hp. installation of 120 Nordberg Radial Gas Engines makes this the biggest story of the year of the largest plant of its kind in the world.

By REX W. WADMAN

POINT COMFORT, TEXAS, May 27th.—Here on the edge of the Gulf, about five miles from Port Lavaca, is located the new Point Comfort Works of the Aluminum Company of America. Some 135 miles south of Houston, the location was selected primarily because of the accessibility of large quantities of natural gas at a reasonable price. The smelting of aluminum requires an enormous amount of electricity, and in this instance, the Aluminum Company decided that they would use gas engines for generating the electricity as the most practical from an economic standpoint. So they erected here on the wind-swept sand dunes of Matagorda Bay the first aluminum smelter in Texas and the largest installation of gas engines in the world. Grading and excavation for the Point Comfort works began in August of 1948. The first aluminum ever made in Texas was poured at the works on February 11th of this year. Between these two dates, a modern aluminum reduction works was constructed on what had been a stretch of pretty wild Texas ranch land. Point Comfort Works are located on a tract of some 3,000 acres on Matagorda Bay and consist of 25 buildings with approximately 18½ acres of floor space. Included among these buildings are the pot rooms, where aluminum is made; the engine rooms for the production of electric power necessary for making aluminum; a carbon plant; and various plant service facilities. The covering of the production building represents the largest single application of aluminum industrial corrugated roofing and siding to date. The greater portion of the aluminum roofing and siding is fastened to the buildings by the stud welding process. The modern, air-conditioned office building contains about 15,000 sq. ft. of floor space. The brick structure includes such applications of aluminum as doors, windows, lighting fixtures, trim and decorative effects. Among the many other applications of aluminum found at the works are the fence, lamp poles, and electrical





Door to "basement" open showing ease with which operators can get into and at generator for each engine.

conductors. The works has several miles of reinforced concrete pipe in its storm sewer system. Sanitary sewers lead to the works' own sewage disposal plant, where a considerable amount of aluminum is employed. A concrete and steel dock has been constructed on the bay and a channel complete with turning basin connects the dock with the Pass Cavallo-Port Lavaca channel. The Point Comfort and Northern Railroad, a subsidiary of Alcoa, owns 14 miles of track between the plant site and Lolita, Texas, where a junction is made with the Missouri-Pacific Railroad. This railroad uses diesel engines exclusively in their equipment.

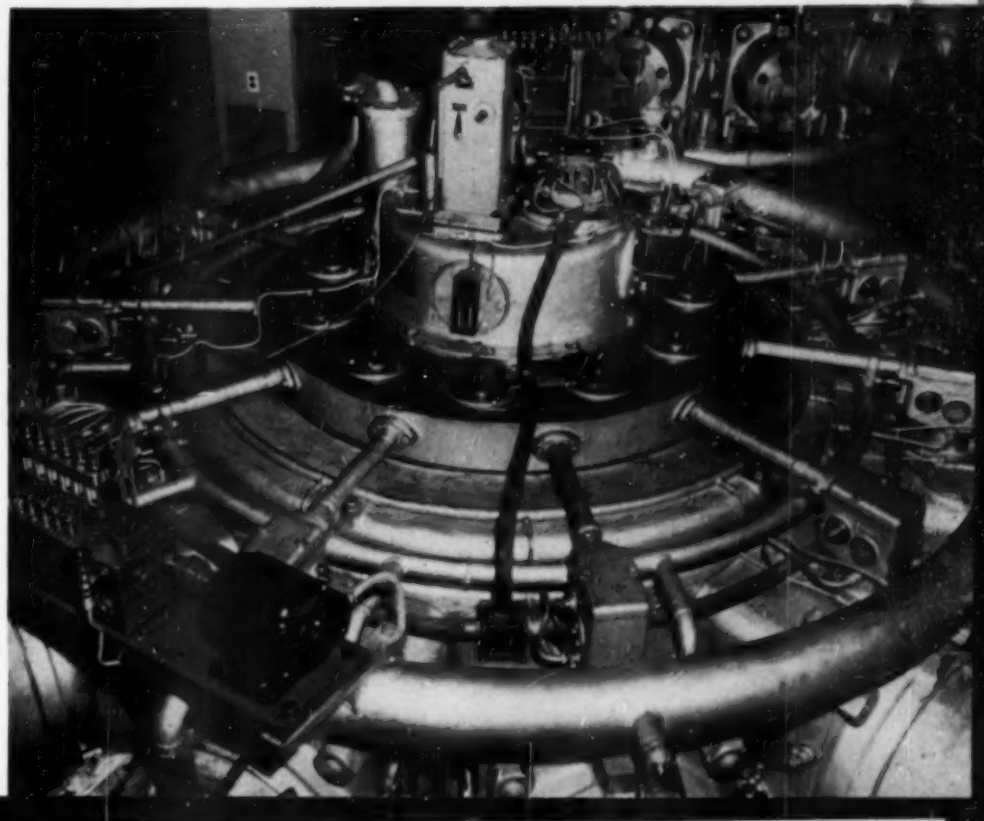
Power for the production of aluminum at this plant has its source in the natural gas fields of Texas. It takes about 10 kwh. of electricity to produce one pound of the metal. Natural gas is delivered at a pressure of from 400 to 500 psi. This pressure is reduced in two stages to 60 lbs. Two 18-inch gas lines connect each of the three power houses with the pressure reducing station. A regulator at each engine further reduces the intake pressure, and in actual operation, gas enters the engine at a pressure of about 6 lbs.

Each engine consumes gas at a rate of 13,000 cu. ft. per hr. under load. Normally, the plant uses more than 30,000,000 cu. ft. of gas per day. Nominal generating capacity of the power plant is 120,000 kw. Under normal operating conditions, the total output of the plant is approximately 2,750,000 kw. hours per day.

One hundred and twenty engine-generator units convert the gas into electrical energy. Forty units are housed in each of three engine rooms, one for each pot line. The engines are of a two-cycle, radial type, built by Nordberg Manufacturing Company. With slight modifications, this engine can be adapted to gas, diesel fuel or dual-fuel operation. The 11-cylinder engine has a 14-inch bore and a 16-inch stroke. Here at Point Comfort the engines are normally operated at 360 rpm., producing 1,600 hp. each. They operate at a thermal efficiency of from 29 per cent to 30 per cent.

The crankshaft in these unique radial engines is set vertically with the crank at the top. The cylinders are bolted radially to a cast frame, having a central hub that carries both the lower crankshaft main bearing bushing and also the thrust bearing which supports the load of the crankshaft. The heavy bolted cover contains the upper crankshaft main bearing bushing. The governor, fuel pumps, mechanisms for gas operation and controls are located on this cover. Circular manifolds for scavenging and exhaust are located in the lower level of the engine room. Intake and exhaust are timed by the pistons uncovering ports in the cylinder walls, and of course no valves are necessary.

Balanced operation is accomplished by use of a



Looking down on one of the 120 engines. Manzel lubricator at left. Woodward governor on top. Distributor for spark plugs at right.

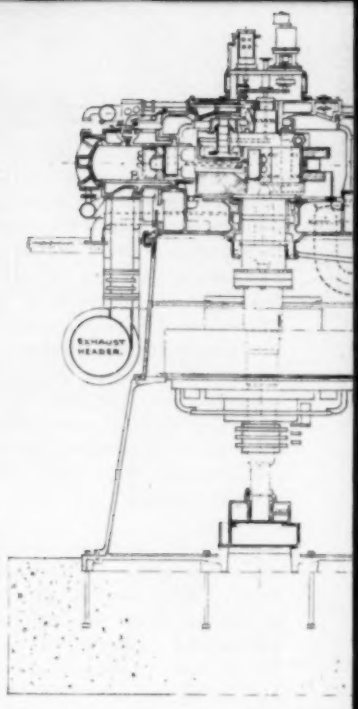
42" CONTINUOUS VENTILATOR
BENT No. 2 to BENT No. 26

master gear, a stationary gear bolted to the cover, two pinions and rotating counterweights. The 11 connecting rods are attached to the master gear by means of knuckle pins mounted in bronze bushed bearings. The master gear gyrates instead of rotating. There is no master connecting rod, commonly associated with radial type engines.

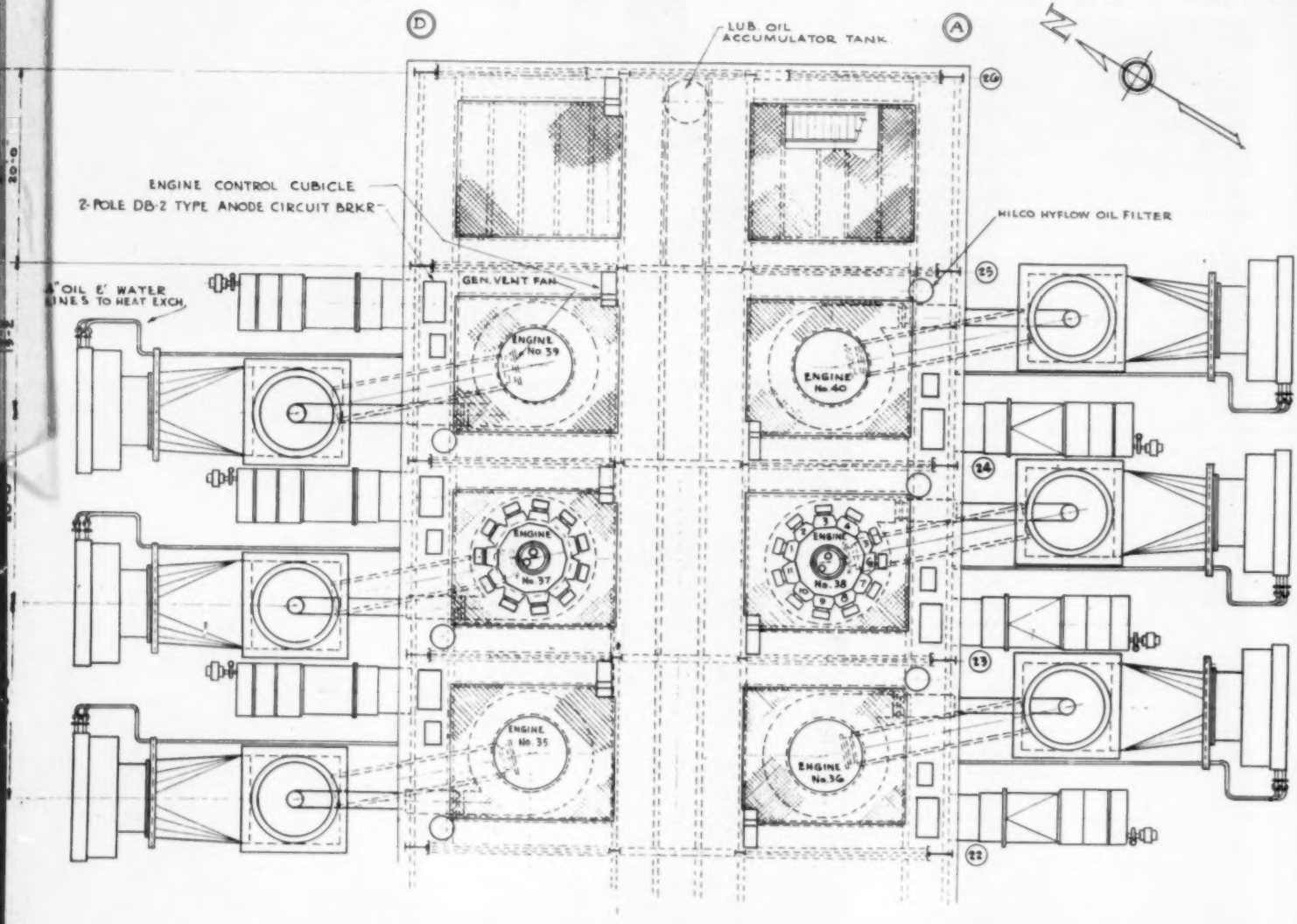
Two systems of lubrication are used. Motor driven, multi-feed lubricators deliver oil to each cylinder for piston lubrication. A circulating, pressure system provides oil for all other parts requiring lubrication and also for piston cooling. When set up for gas burning, the engine operates on reduced compression, with spark ignition. Natural gas is admitted by cage mounted gas valves. The valves are operated by a cam on the crankshaft and are so located that gas is admitted into the path of incoming scavenging air. This assures thorough mixing and efficient use of the fuel. A valve inserted in the gas line and controlled by a governor varies the amount of gas delivered to the cylinders according to the load on the engine.

The electric generators are located in the lower level of the power house and are joined to the engines by direct coupling. Each engine-generator unit, with its auxiliaries, operates independently. Each generator produces 1,000 kw. (dc.) at 667 volts and 125 kva. (ac.) at 425 volts and 24 cycles. The ac. power is used for driving the engine auxiliaries. This eliminates the need for a common auxiliary power system and the possibility of a total station interruption. For starting purposes, the generator is motorized.

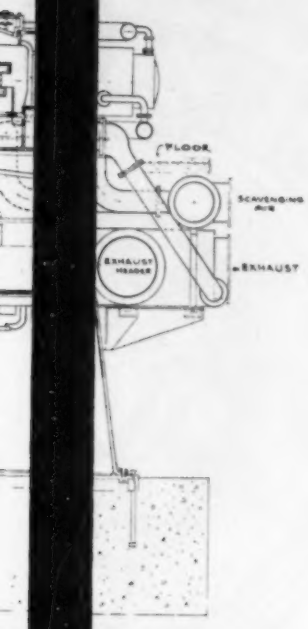
Each engine-generator unit has its own control panel which includes engine protective equipment. Frankly, as I went through this huge plant here today, this automatic control board struck me as one of the outstanding features and I will try to give you a detailed description of this panel. The protective equipment mounted on each of these panels causes the engine to shut off automatically for such reasons as low oil pressure, high water temperature, high exhaust temperature, over-speed, high generator temperature, or loss of auxiliary power. If you will refer to the large illustration of the control panel on page 53, you will find indicating instruments for generator output on the

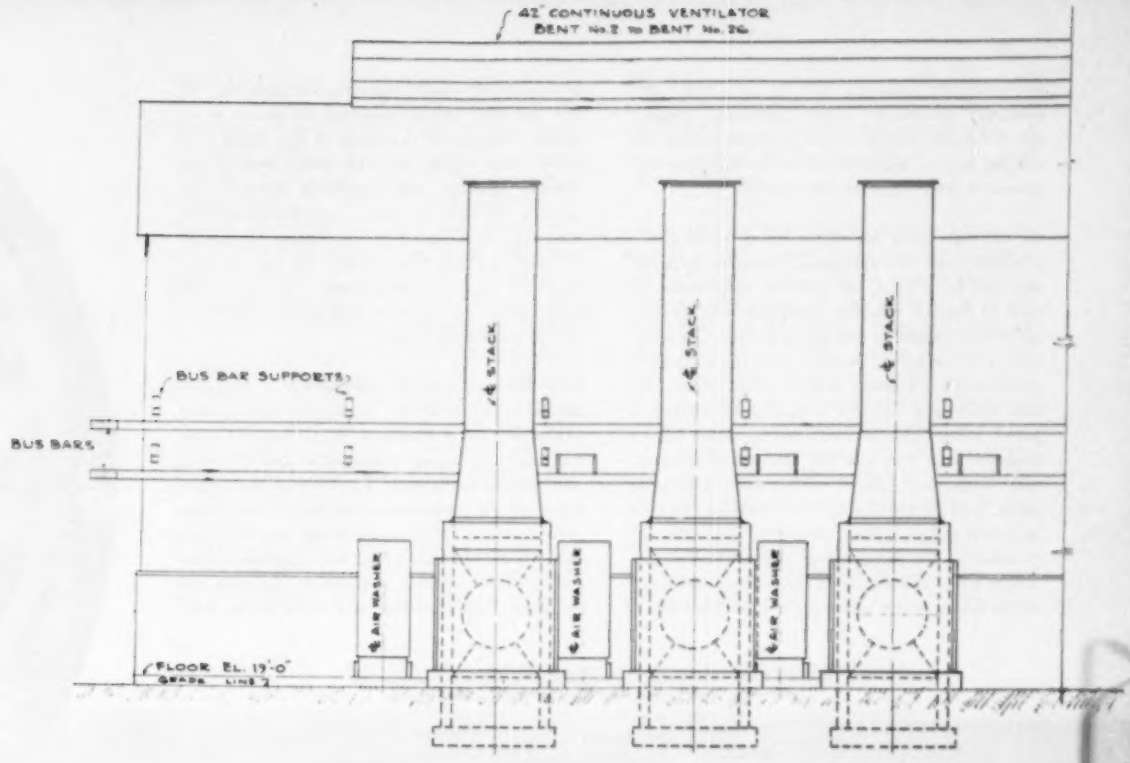


SECTION THRU GAS E

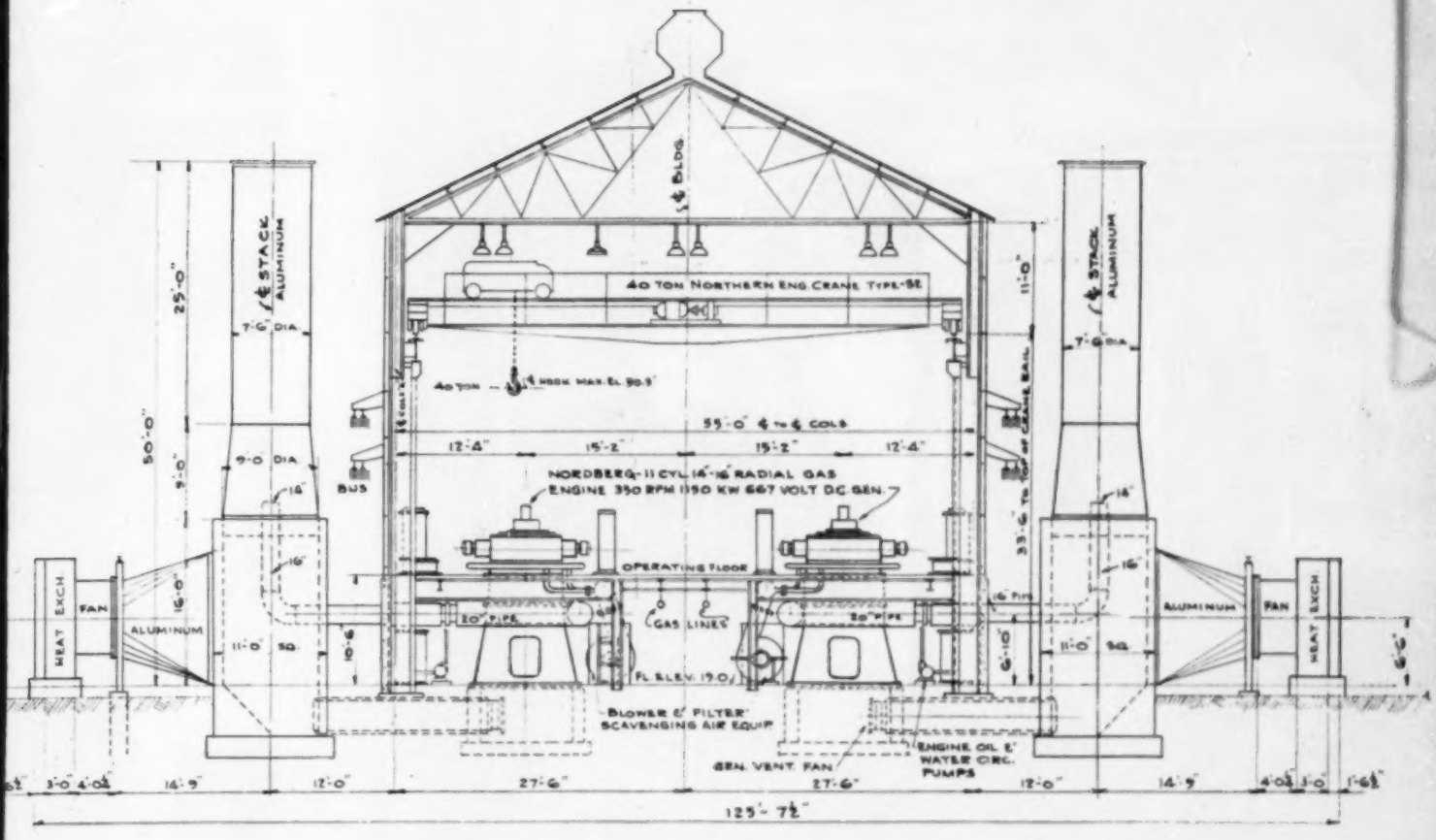


· PLAN VIEW - BLDGS. 5·7·9





SIDE · ELEVATION.



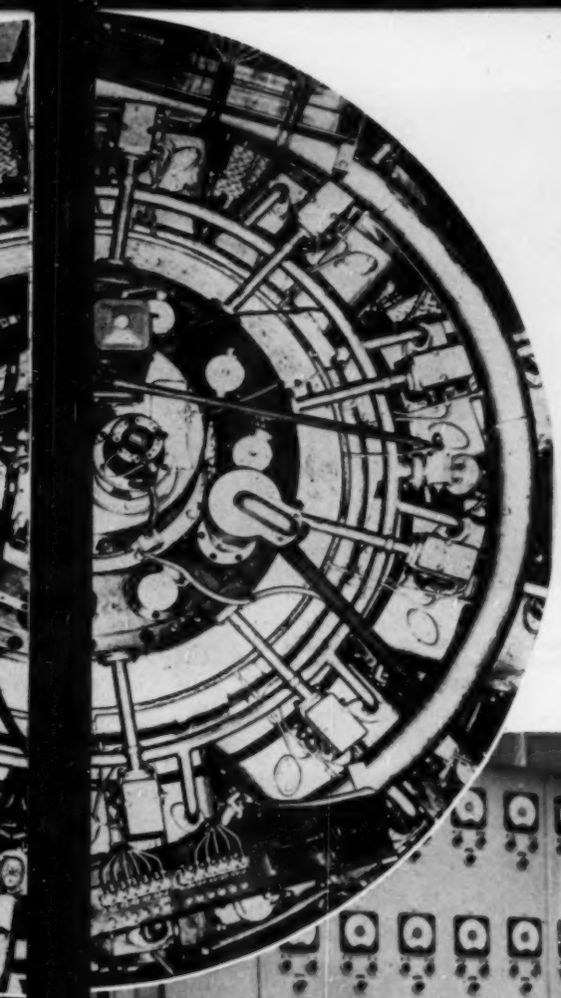
TYPICAL SECTION THRU ENGINE HOUSE.

left hand side consisting of a dc. volt meter; dc. ammeter; frequency meter indicating engine speed; throttle control—which is remote control for starting engine; generator circuit breaker controls; generator shunt field rheostat control.

On the right hand side of the board, which is the protective end, the indicating pyrometer is at the top, which indicates the exhaust temperature of each of the 11 cylinders equipped with a thermo-couple transfer switch motor driven. The sensitrol relay connected parallel with the indicating pyrometer has a preset pointer which makes contact when any cylinder temperature reaches a preset point. This in turn trips off entire engine from the line. You will find also the oil temperature indicating gauge; oil pressure indicating gauge; and the circulating water pressure and temperature gauges. Then comes the injection gas pressure on the engine gauge and a series of protective relays and associated annunciator lights and in the center of the board at the right hand side is the manometer which indicates scavenging air pressure and from which scavenging air control is obtained. The actual operation of this board is as follows: The engine trip relay which shuts off gas, removes ignition, trips generator breaker, also lights a red light to attract operator's attention. That relay is energized by: (1) Engine over-speed; (2) high exhaust temperature; (3) low oil pressure; (4) high oil temperature; (5) high water temperature; (6) excessive generator temperature; (7) thrust bearing failure.

Now here is a control board which is practically human in its operations. In fact, it is superhuman. When any of the dangerous things itemized above happens, this board immediately and effectively shuts off the entire unit. The heart of this control panel is the combination pyrometer with motor driven switch. This continuously operated pyrometer is the first that I have seen applied to either gas or diesel engines. Telephone type relay contacts are closed by action of a motor driven roller

Blower Room showing a few of the 120 Buffalo Scavenging Blowers. American Air Filter in right foreground.



arm. The contact leaves are mounted radially upon a machined aluminum ring having a heavy cross section to provide mechanical stability. Small cylindrical plungers, distributed around a central circle in the ring, were placed so that they could slide through holes in the ring and thus close the contacts. The motor shaft is mounted concentrically with the ring so that it drives the roller arm around the previously mentioned circle of plungers. A roller carried on the outer end of the roller arm pressed upon each plunger and moves it against the contact leaves, causing the contacts to close. Of course, in actual operation, this continuous motor driven pyrometer is automatically reading the temperature of each cylinder and when any cylinder exceeds the preset temperature, the instrument automatically talks to the sensitrol and the engine is shut down.

In addition to these highly effective unit control panels, each power house has a master control room with recording and indicating equipment registering the operation of each of the 40 engines and generators. No unit can be shut off from this master control room, but it does provide a central point from which the operation of all 40 units can be observed.

Centrifugal type scavenging air blowers, which provide air under pressure to the pressure cylinders, are each driven by a 100-hp. motor and these blowers supply air at the rate of 7,000 cu. ft. per min. The axial flow type, generator cooling air fan is driven by a 7½-hp. motor. This fan supplies air at the rate of 12,000 cu. ft. per min. Along the wall behind each generator are the high speed, generator switch gear, generator control and starting equipment. Combination oil and water engine coolers were built specifically for this job. These heat exchangers are approximately 15 feet by 11½ feet by 3 feet in size. They are all-aluminum construction except for the iron headers. The tubes are arranged in banks of three with the water tubes in front of the lube oil tubes. The

Main control room for all three engine rooms. No engine can be shut down from here but overall control is obtained.

tubes and vertical fins are joined mechanically. Each exchanger consists of four sections which are independent of one another except for connection to a common manifold. Individual tubes may be cleaned or cut out of the system without interfering with the operation of the rest of the exchanger. An 84-inch diameter heat exchanger fan, having six adjustable blades, is driven by a 25-hp. motor. Oil and water circulating pumps are driven by a common 15-hp. motor.

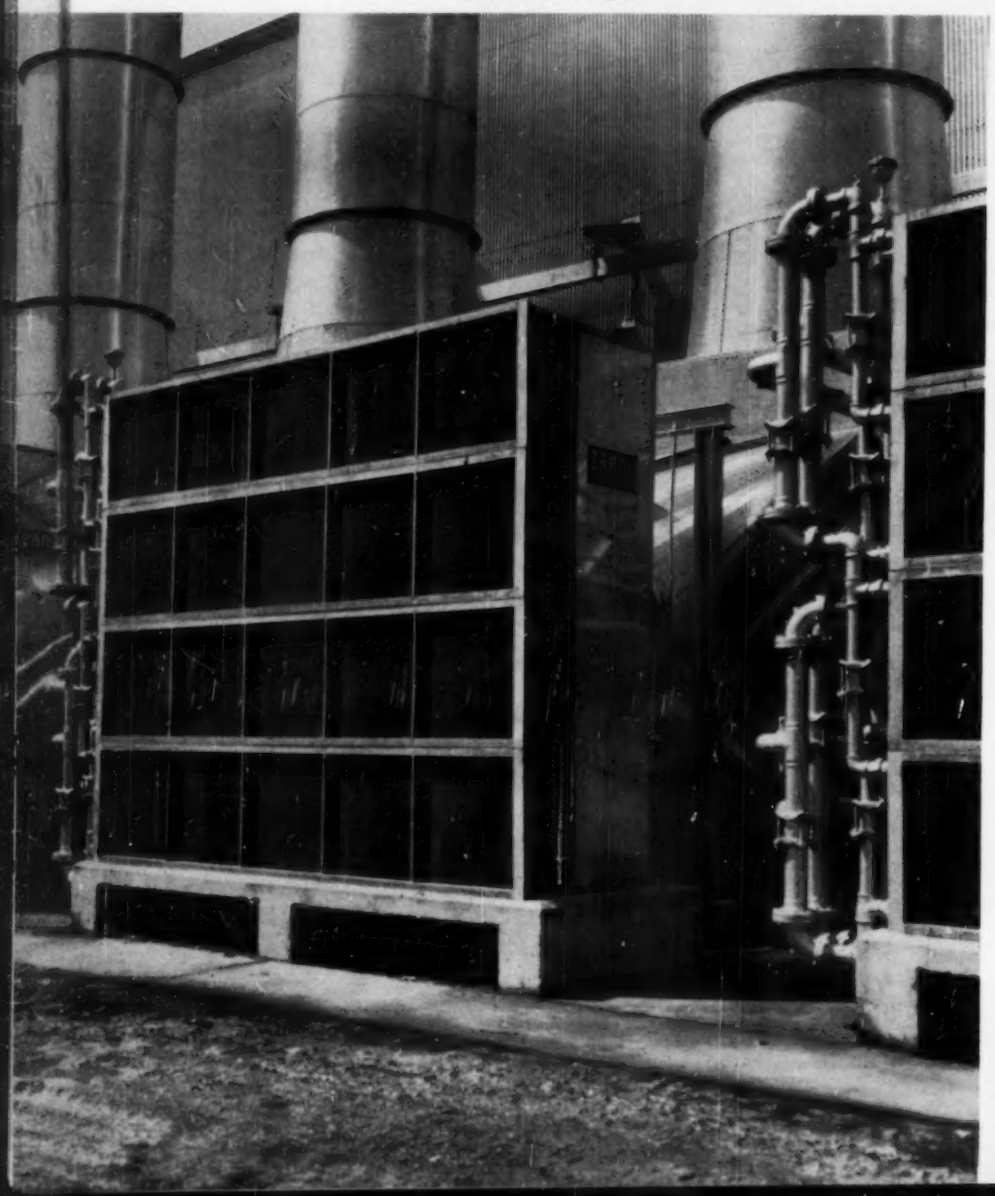
Each engine room has forty air washer units, located immediately adjacent to the heat exchanger on the outside of the building. These all-aluminum units have housings of 14 feet by 5 feet by 5 feet in size. Each unit contains thirty all-aluminum washer cells, and has an air capacity of 35,000 cu. ft. per min. Water is sprayed through the unit at a rate of 125 gals. per min. All air entering each of these three big engine rooms is water washed by these air washers and then inside the engine room, each engine unit is equipped with an Airmat type of air filter. This Airmat filter is laminated cellulose product comprising several plies of porous tissue-thin sheets held together loosely by line embossing. The crinkly tissue sheets are composed of felted cellulose fibers in "jackstraw" arrangement. These Airmat filters are proving to be highly efficient in this huge plant, taken in conjunction with the air washers on the outside of the building and these cellulose type filters attached to each engine the air delivered to each engine is just about as clean as it is possible to make it.

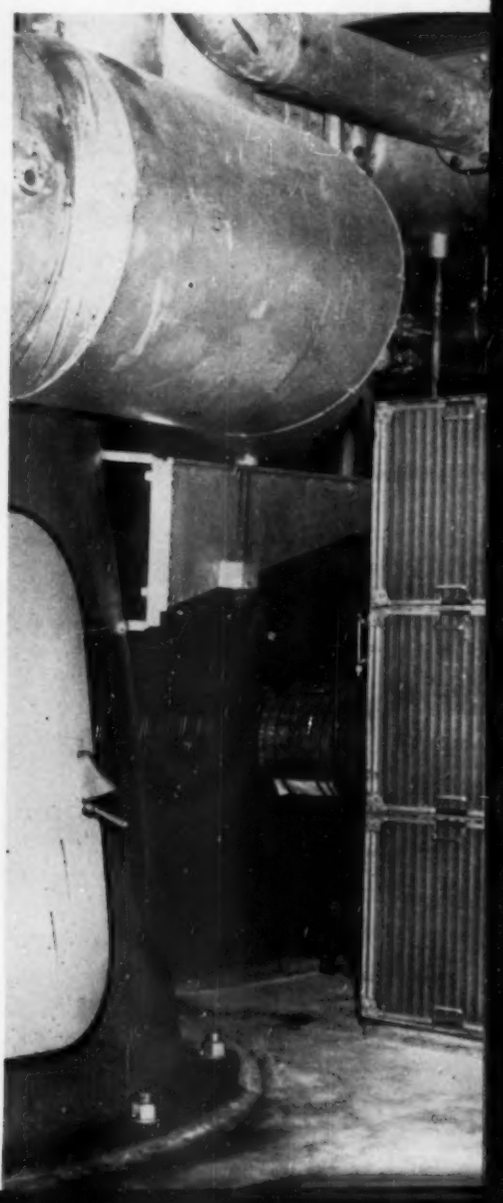
Each engine-generator unit has its own stack, which handles engine exhaust, generator cooling air, and the air from the heat exchanger. 7½-foot diameter stacks, having an overall height of 50 feet, were made from ⅛-inch aluminum sheet. The all-riveted stacks were fabricated right here on the job.

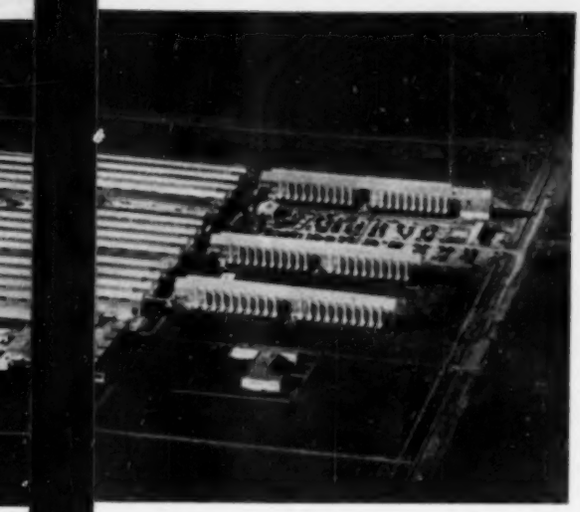
The lube oil filtration is handled by an activated alumina type unit on each machine which can be seen alongside the wall in the general engine room photograph. These are by-pass units. Lube oil reclaiming is handled by two centrifuge machines in a separate building and of course operate on the batch system.

Airview of the Point Comfort Works, Texas. Three engine rooms on right.

Close-up of Trane heat exchangers handling both lube oil and cooling water. One unit like this for each of the 120 engines.



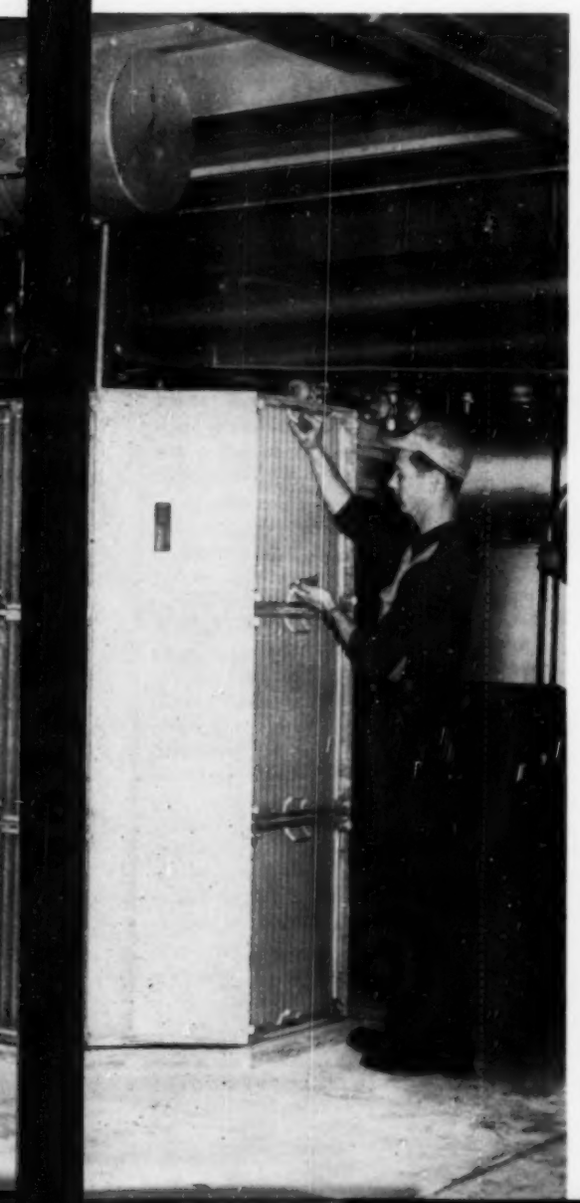


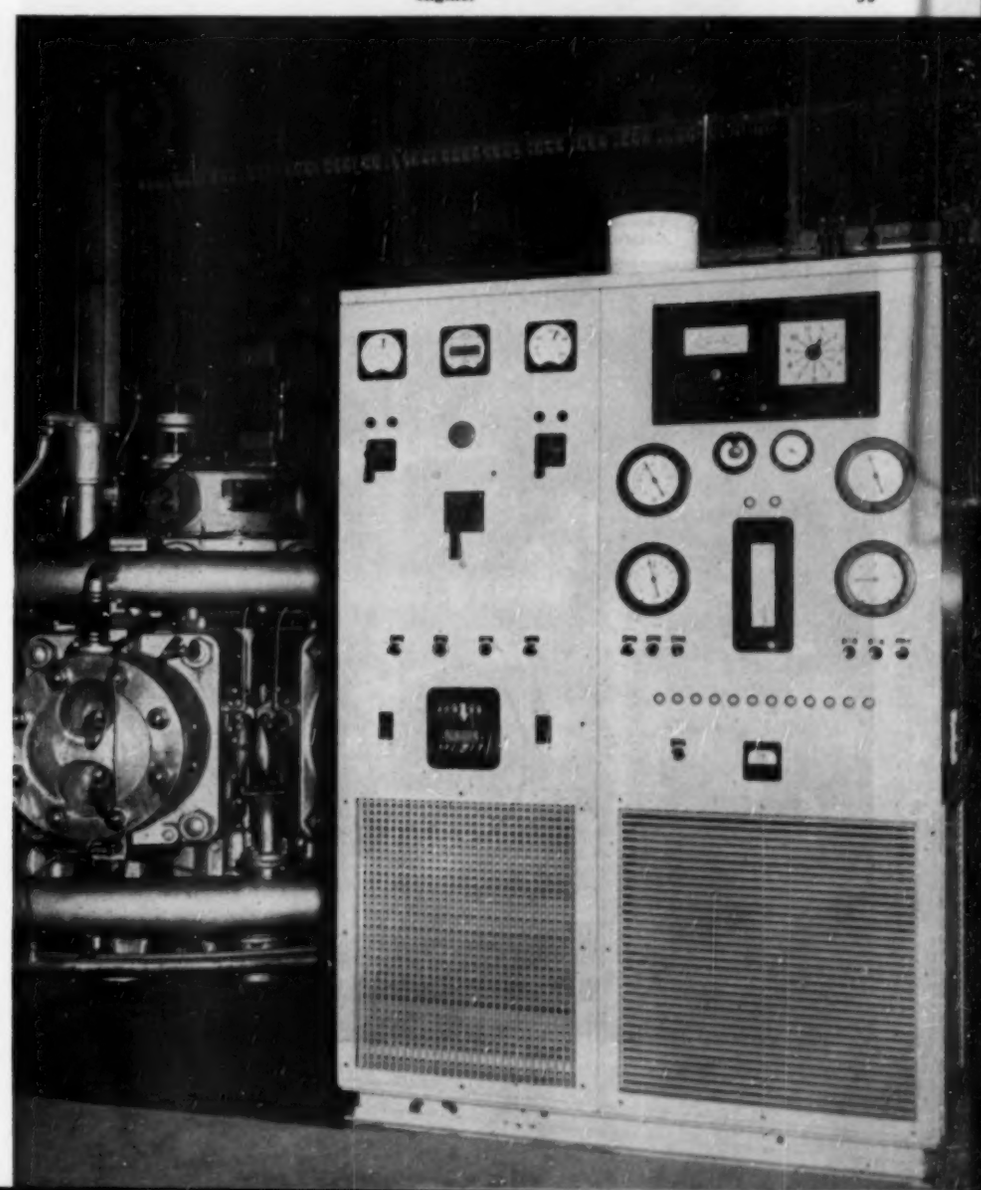


American Air Filter installation for each of the 120 engines. Air is water washed by Continental air washers coming into the engine room.

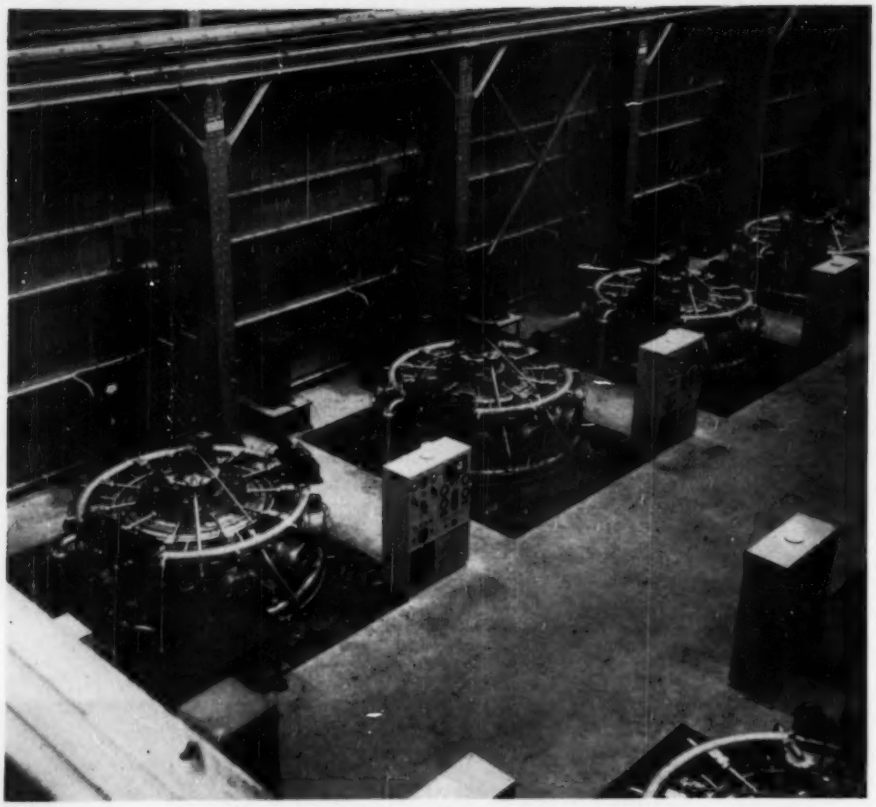
When you realize that we have here at Point Comfort 120 engines all of the same size, all rated at 1,600 hp. each, you will see that here in one plant we have 192,000 hp. of radial gas engines. For convenience of operation, these 120 units are split into three separate engine rooms, 40 engines and 40 generators to each engine shop and each of these three engine shops are operated by three men and by three men only on a shift. These men have the use of a little motor scooter which they operate up and down the long alley between the engines. As mentioned above, each engine has its own control panel with its red light annunciator which instantly calls an operator's attention to trouble. With a motor driven pyrometer switch and other automatic instruments, it is only necessary to read pyrometer temperatures, lube oil pressures, etc., once each shift instead of once each hour which is frequently the practice in the average plant.

Naturally I was interested to find out why the aluminum company came down here to Point Comfort for one thing and why they selected gas engine drive for the other. I found that except for short periods during World War II and the early days of the industry, hydro-electric power has always been used for the production of aluminum in Alcoa's plants. Since low cost electric power is an important consideration in making aluminum economically, the industry is constantly looking for new power sources. It was for this reason that the Point Comfort area, with its natural gas, was chosen for the construction of Alcoa's new reduction works. The Lavaca Pipe Line Company, a subsidiary of Alcoa, was organized for the purpose of operating the pipe lines necessary for gathering and distributing the gas to be used in the works. Gas is received from both on-shore and off-shore wells. One pipe line built in the fall of 1949 runs between Point Comfort Works and the Francitas Gas Company's recycling plant near Francitas, Texas. There are approximately 11 miles of 10-inch pipe and 5½ miles of 8-inch pipe in this line. Another line consisting of 7½ miles of 8-inch pipe ties into the off-shore line in Matagorda Bay. The main underwater line, in Lavaca and Matagorda Bays, consists of approximately 14 miles of 8-inch pipe, about 12½ miles of it under water. In addi-



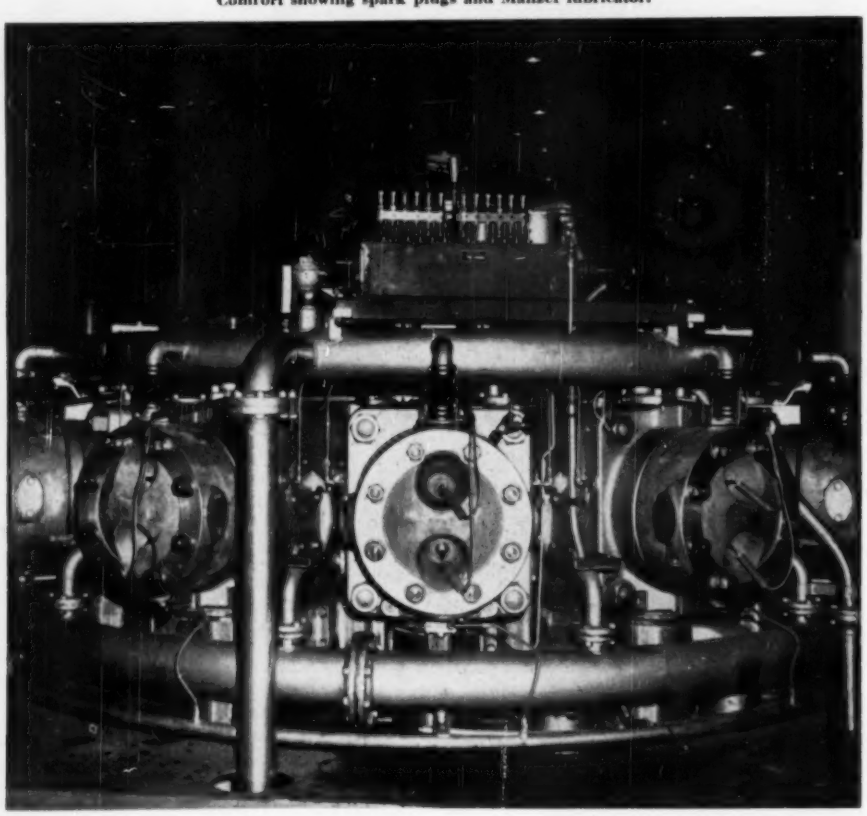


Control board for each engine. Alnor combination Pyrometer and Motor Driven Switch works with other instruments to automatically shut down engine.



Close-up of four of the radial engines with control panel to the right and Hilliard lube oil filters against the back wall.

Close-up of one of the 120 engines here at Point Comfort showing spark plugs and Manzel lubricator.



tion, approximately 9 miles of 4-inch and 6-inch pipe are used for the off-shore gathering lines. The average depth of water in the gas field is about 14 feet. Work on the off-shore line was started in April, 1948, and was completed the following October. The pipe was coated, wrapped and then welded in 1,000-foot sections. Next, five of these sections were welded in 5,000-foot lengths on dollies placed on greased launching tracks. River weights and buoys were attached to the pipe, and the sections were pulled into the water by tugs. Off-shore welding was done with the pipe held out of the water by an outrigger at the stern of a converted L.S.T. and by the boom of a dragline extending beyond the the bow of the boat. After the welding was finished, the buoys were cut free and the pipe was allowed to sink. This system supplies the 30,000,000 cu. ft. of natural gas required daily by the Point Comfort Works.

It has been an extremely interesting experience for me to visit this huge aluminum smelter. I wish that I had the space to tell you of the actual process that takes place in this plant, but I will have to wait until a later issue for that. The one thing that stands out as you go from one point to another is the careful thought and engineering experience which went into the design not only of the engine rooms but also of the entire plant. In the engine rooms the splendid engineering in the 11-cylinder radial engines is obvious. Here you have concentrated 192,000 hp. of gas engines in a comparatively very small space. The engines themselves operate with practically no vibration and the amount of space that each one occupies is of course materially less than would be the case had the ordinary type of 1,600-hp., 360-rpm. engine been installed. Such details as the motor-driven switch on the pyrometer and the distributor for the spark plugs were designed for these engines and show a high degree of ingenuity and engineering skill. A new type of internal combustion engine has been developed to assist in reducing the cost of making aluminum. The Aluminum Company of America and its capable corps of engineers are to be heartily congratulated on designing, building and putting into successful service a very fine generating plant.

List of Equipment

Main Engines—120 Nordberg radial gas engines.
Generators—General Electric, 40; Elliott, 40; Westinghouse, 40.
Governor—Woodward.
Lube Oil—Gulf Parvis "H."
Lube Oil Filter—Hilliard.
Lube Oil Reclaimer—De Laval.
Intake Air Washers—Continental Air.
Intake Air Filters—American Air.
Exhaust Pyrometer—Alnor.
Heat Exchanger—Trane.
Cooling Water Pumps—De Laval.
Switchboard—Nelson Electric Company.
Scavenging Blower—Buffalo Forge.
Sensitrol—Weston.
Tachometer—James G. Biddle.
Manometer—Meriam Instrument Company.
Lubricators—Manzel.
Ignition Equipment—American Bosch Corp.

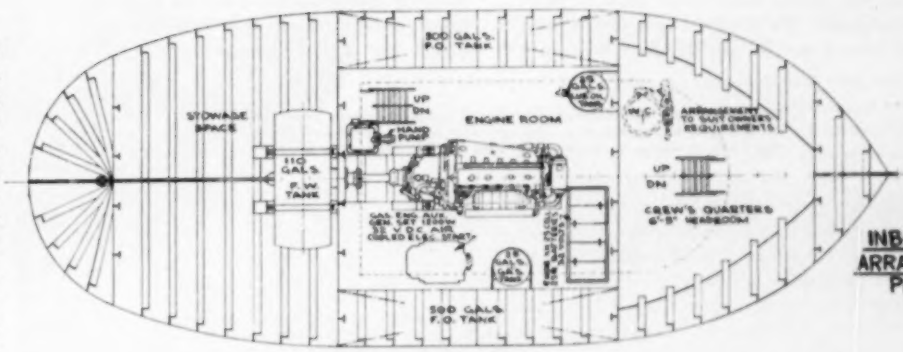
SMART NEW DIESEL TUG DESIGN

By DOUGLAS SHEARING

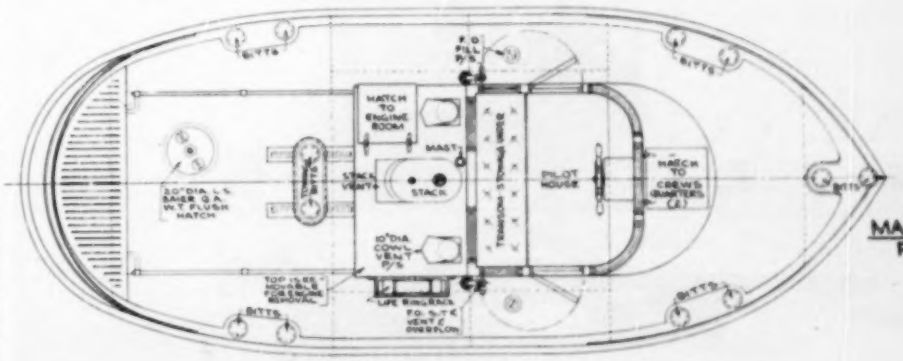
OUTBOARD PROFILE

ARCHITECT Frank J. Schmid has designed this 31-foot steel tug, which indicates the capability of a larger boat, and this design might well be applicable to numerous jobs usually reserved for boats twice her size. Actual dimensions are 31 ft. by 12 ft. 6 in. by 5 ft. 6 in., displacement of 5 ft. 6 in. draft is 39,450 lbs. A double chine hull form. Electrically welded hull throughout of steel. Power consists of a General Motors 200 hp. diesel with 4:5-1 reduction gear turning a 2½-in. diameter monel propeller shaft, swinging a 48-in. diameter by 38-in. pitch bronze propeller. The fuel capacity is approximately 1,000 gals., giving a free cruising range of about 1,200 miles. Under average towing conditions her cruising range is about 600 miles. A fresh water tank capacity of 110 gals. adds to her ability to take a long tow without stopping.

The blower fans on the 10-in. diameter cowl vents will assure sufficient ventilation to the engine room. There is also something which was adopted from her larger brothers, a vent in the stack, giving additional air to the machinery space. Her crew's quarters can accommodate two men, and with the transom in the pilot house can bring her full complement up to three men when needed. Her excellent lines and counter stern should make her quite a fine sea boat, with plenty of ability to take it when the going gets rough. It is expected that with this diesel power plant her speed will be approximately 10 knots.



INBOARD ARRANGEMENT PLAN



MAIN DECK PLAN

"BINDLE STIFF" TO DIESEL DRIVER

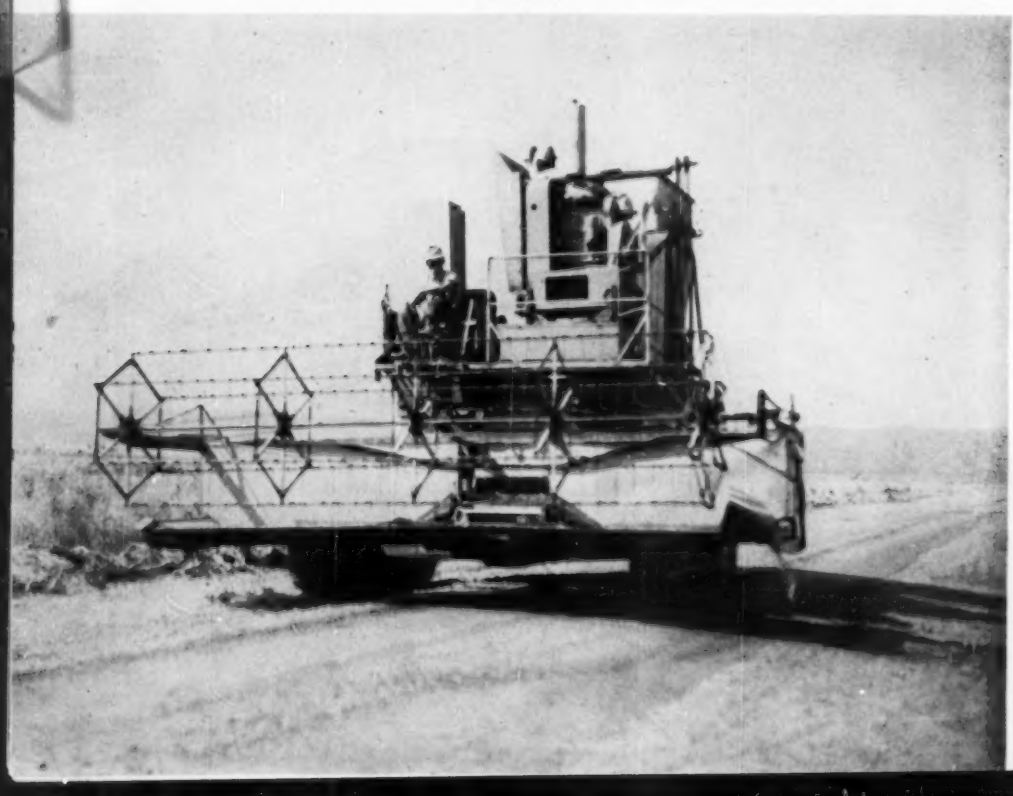
California Ranch Labor Has Been Lifted from "Mule Train" Plowing and Harvesting at Long Hours and Low Wages to Skilled Operator-Mechanics Working All Year at Top Pay

By F. HAL HIGGINS

THE Califorina "farm hand" of today is a skilled operator-mechanic equipped with enough diesel-powered tools to permit him to earn as high a wage and live as well as his brother in the industrial shops. This is true of field crop farming like grain, rice, alfalfa, beans, lettuce, carrots, cabbage, sugar beets, etc. The trend is rapidly moving in the same direction for farm labor in fruits, nuts and the hundred-odd other special crops that make the state's agriculture the most diversified and specialized for any similar area on the face of the globe. This new model farm and ranch worker is a family man with year round employment at high wages. It wasn't always that way. The 100 years of statehood we are celebrating this year has seen the farm worker come up from a wandering wifeless seasonal bum called a "bindle stiff" because of the blanket roll he carried over his back as he tramped from ranch to ranch between harvest seasons.

For some unknown reason, farm labor has never been given much attention by writers, dramatists or movie producers. Yet this California ranch hand has been a colorful worker in his rise from migrant 6-bits-a-day harvest hand to his status as diesel farm engineer. The writer has been studying these farm laborers over the past 22 years as he watched the mechanization of the various crops cut down "stoop labor" and lift the workers to the seats of machines at higher wages, more stable jobs for more days work and better living conditions. The economic pressure on the farmer to mechanize was always there through depression, war and peace. The farmer has had to compete against the Gold Rush, transportation, industry and war for his labor supply. Hence, he got what was left. What was left in the pioneer days of the grain harvester included ex-sailors waiting for the grain boats to sail at the end of the harvest; deserters from Army, Navy and merchant ships; gamblers, who came to harvest the wages of the harvest hands on pay day; gold seekers whose luck had been mined out; adventurers who came west to see and participate in the hectic and widely advertised romantic California doings. These harvest workers included bank, train and stage robbers; discharged soldiers from the Civil War, as well as green farm boys seeking escape from the drudgery of eastern farm work. "How would you compare these hand-picked diesel tractor and combine operators your sons now have working on this horseless farming system they manage so well?" The writer put the question to one of the old timers who had seen it all in California farming in the Sacramento Valley from the bonanza days of "Doc" Glenn, who raised a million bushels of wheat in 1880. He had lived next ranch and knew the Glenn operations that set the pace for the Sacramento Valley grain farming. "Recalling the Glenn Ranch crop of 1880 when his threshing machines with Jackson feeders and 6-horse headers were mobilized to harvest via 600 men and 800 horses and mules, couldn't the Heidrick layout of 40 skilled men as managed and equipped as we see them this year do the job of harvesting a million bushels of grain quicker and better for a big saving in time, grain and weather hazards?"

The 70-year-old veteran grain and rice farmer looked across at his son Fred, the managerial brains of the father-and-two-son team that had reached the wartime peak in world grain and rice harvest. "Let's see," mused Fred, as he used a pencil to figure Heidrick's 20,000-acre farming operations scattered over a twelve by eight mile area. "If we had ours all in one block, we could do it. And our diesel one-man combine operators get $20 a day; diesel tractor operators $15; truck drivers $12; other hands $1 an hour. In contrast the Glenn hands of the bonanza days got 75 cents a day in the lean years and up to $1.50 later; steam engine operators usually $2.50 to $3 a day; and the Chinamen who did all the house, garden and such work, a lower rate yet. But today, with all this diesel



Earl Wallace's GM diesel-powered self-propelled bulk combine on the road between fields. The operator is a top hand and draws the highest wages in the harvest, $16 to $20, depending on crop and owner.

Filipino field hand cutting head of lettuce as he did it before he went to war to fight the Jap in the Pacific. Now he is back with much higher standing in the U. S. and is finding the machine trends are shifting most of the stoop jobs to machines.

Cletrac diesel (Hercules engine) picking up truck load of celery as cut and boxed in field for fast run to market in San Francisco, 50 miles away. The owner of crop and workers in harvesting crop are Japanese-Americans. Driver of tractor is the envy of all, but all plan to have such jobs as soon as they can.

He stoops to thin sugar beets! Mexican field hand as caught at work before World War II in California. A complete program of mechanization from seeding to harvest has eliminated the necessity for most of this type of work. Many of the younger and better educated Mexicans of U. S. birthright have learned and are advancing to the machine jobs, including operation of diesel tractors and trucks in some areas. This is especially true on the border in the Imperial Valley.

equipment, we don't want any of that old 'bindle stiff' labor. It was not responsible for any tool and was incapable of handling such expensive power tools and machines as our men have here. The bindle stiff was neither educated, responsible nor very trustworthy. He had neither family nor responsibilities as regards his employer and community. Now these fellows we have here today have autos, live in town with their families, are ambitious to get ahead. There is no comparison. We could never go back to that kind of so-called cheap labor. The high wage skilled labor, teamed up to keep the machines rolling through the season with ability to repair and service them at end of harvest season, pays for everybody—farmer, laborer, community and nation."

Arthur B. Domonoske, a former professor at Stanford University, who was raised on a Sacramento Valley grain ranch, recently set down his recollections of the men and their jobs as he recalled them in the thresher-combine change-over period of his father's ranching operations.

In addition to the header crews, a choreman or roustabout pumped or hauled water, kept the mangers or feed racks filled, removed manure, and did other jobs not delegated to the crew. Drivers and header runners curried and harnessed their own teams and were responsible for cleaning and adjusting collar pads. They also doctored sore shoulders by washing and the application of a mixture of lard, turpentine, and carbolic acid.

"Last but not least, was the Chinese cook, who might operate from a permanent kitchen or in a cook wagon. Sometimes the morning and evening meals were at a permanent camp while the noon meal was taken, in a large especially built lunch box, to the field by the choreman.

"Human Relations: No reproduction of these early scenes is possible without some knowledge of the personnel involved. Harvest in the seventies and eighties required many men. Where did they come from and what manner of men were they? In the earlier days many came up from the docks and warehouses of Port Costa, then a great grain shipping center for the Central Valleys. After the long harvest run (sometimes as long as 120 days) they would return to Port Costa for the winter. A large percentage of these men were Irish, with all the wit and rough and tumble playfulness of that race.

"Later our crews came largely from Germany and from the surrounding territory. There were numerous English, men from the middle west, and the native son. The Chinese were mostly Cantonese, but no matter what port they sailed from, all races were eager to undertake life in the new world. I have never seen the name of an Oriental (except the Chinese cook), a Mexican, or Italian on a threshing machine time-book. I did know a Chinese that worked as a loader in the heading season. A large number were very intelligent and ingenious and their suggestions became part of the early day machinery development.

"What did these men earn? In my father's time-book for threshing in the nineties, I find the following:

The Van Dyke B-29 bomber-tired bank-out rig unloading rice into a truck at roadside. The bank-out rig goes out through the rice fields over levees and through mud and water if heavy under foot and takes off a bulk load from the combine when tank is full. Bank-out is big enough to take the combine's full tank at one trip. Note tractor driver giving the unloading job his attention as the truck driver comes back for a 5-minute visit as load is transferred.

Heidrick Brothers' diesel tractor and combine crews pose at lunch time in front of their ranch shop where they tear down, service and repair their combines and tractors between seasons of grain and rice harvests and seedbed work. Every one not already there is ambitiously working to land in the seat of those three diesel-powered one-man bulk combines the Heidricks developed and built to solve their rice and grain harvests for a big advance in efficiency and shortening of season to reduce weather hazards. Those diesel combine jobs draw $20 a day for the operators, which is better than they can do on most Big Town factory jobs.

The "Little Brown Men" manning this diesel tractor-pulled 4-row potato planter used to get only the stoop jobs in the ankle-deep delta peat soil, but mechanization and war have combined to lift them to a new status. Many have even started farming for themselves. Here the whole crew are Filipinos, and all take a pride in operating, servicing and working on the diesel-powered machines that have swept across California and the West in the past decade and a half.

CASH COST PER DAY OF THRESHING

Engineer ($4) and Fireman ($2)	$ 6.00
Water Hauler	2.00
Roustabout	2.00
3 Forkers—$3 each	9.00
3 Derrick Drivers—$1.50 each	4.50
4 Hoedowns—$2 each	8.00
2 Sewers—$3 each	6.00
Sacktender	2.50
Straw Buck	2.50
Oiler	2.00
Cook	2.00
	$46.50

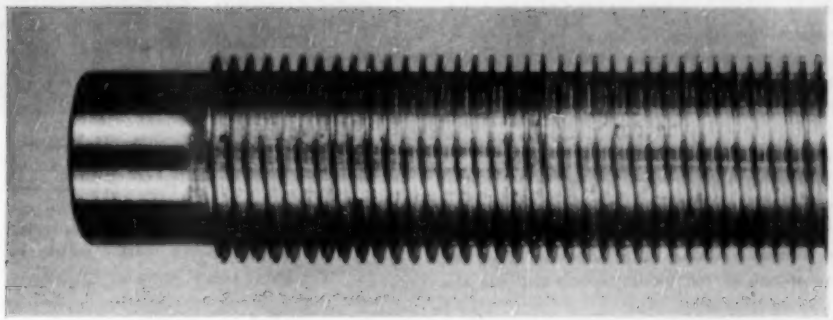
"In addition they received board and a place to sleep if at a permanent camp. More often they spread their blankets on the ground in the open. The fireman arose at 3 a.m. to have steam pressure ready when he blew the 'getting up' whistle at 4 a.m. The cook likewise rolled out at three. Many of these men saved their earnings, rented land on a share basis, and finally bought farms of their own. Compared to present-day standards, living conditions were tough. Sanitation was almost non-existent and only the frequent moves and the ability of new soil to absorb the refuse prevented severe epidemics. Usually no screens were placed on the cook wagons for fly protection and here again moves were an asset, as the fly breeding manure of the teams was left behind. I can but admire the resourcefulness and the ability of the Chinese cook to have meals on time and with a minimum of spoilage without refrigeration other than homemade evaporative coolers. Meat was delivered in butcher wagons making rounds of twenty to twenty-five miles a day. The crew always swore that the buzzards followed these wagons from shop to door. This was not the exact truth, but close to it. Dish washing was at least as sanitary as our present-day restaurant practice."

That California cotton farming is rapidly following its historic pattern set in the mechanization of its grain, rice, hay and sugar beet crops in re-equipping its labor for higher wages by more and more diesel-powered tools skillfully operated and managed is seen in the reports of farmers, university engineers and USDA cotton station technicians at the recent University of California Farm Machinery Conference. Mechanical cotton pickers increased from 400 to 850 in 1949. The length of harvest season was materially cut to raise crop quality. But the big cotton growers find they are having to farm better with other crops and live stock added to get and keep the top quality dieselized labor they need for handling machines from diesel tractors that work throughout the year to the cotton picking machines. Hence, the number of hours their labor works on the ranch is greater for the year with higher wages, better housing and no child labor. Instead of the Big Town sob story visioned by the New Dealers some years ago when the cotton picker was being talked of as on the road to success, the machine is bringing a stabilized, better paid, better housed farm labor with child labor eliminated as the machines go in and take over. All the New Dealers really need worry about is halting the influx of foreign labor and shifting stoop labor to trained workers who can operate and service diesels.

Why the LK-FIN Exchanger

is more effective... more compact... more economical

for lube oil and jacket water cooling



When cooling apparatus was first applied to Diesel engine lube oil and jacket water more than 50 years ago, the coolers were of the traditional type . . . a bundle of conventional bare tubes within a shell. That was the only kind of cooler known in those days.

But since then, many major improvements have been made in heat transfer apparatus. One of the most important of these developments has been FINNED heat transfer surface . . . that is, tubes with fins attached to the outside. These fins greatly increase the external heat transfer surface, thereby permitting a considerably shorter tube to perform the same cooling effect that requires a much longer bare tube.

Griscom-Russell has pioneered in the development of finned type heat transfer equipment for almost 20 years. Now Diesel engine users can have the benefit of this development as applied to lube oil and jacket water coolers.

The result . . . more effective heat transfer because of the finned tubes . . . a more compact cooler because of the more effective heat transfer surface . . . a more economical unit because of the shorter tubes and shell.

The LK-FIN Cooler has many additional advantages, too. The tubes are free to expand and contract. An outside packed gland at the floating end permits detection and elimination of leakage. Tube interiors are readily accessible at the stationary end without disconnecting piping. The coolers are built as stock units for quick shipment in any quantity.

Complete description, specifications and prices will be sent without obligation.

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GRISCOM-RUSSELL

High-Speed Diesels . . . Design, Operation & Maintenance

CONDUCTED BY **H. G. SMITH**

COOLING SYSTEMS

THE requirements of modern high-speed diesel engines and the severe conditions under which they are often operated, make it necessary that the engine cooling system be maintained, as closely as possible, to maximum efficiency at all times. Many pieces of equipment are powered with comparatively large engines which develop proportionately large amounts of heat that must be carried off. Also, cooling is often more difficult because the equipment may be operated at low speed and full throttle in high gear. Power requirements, which may range from high speeds on surfaced roads, to heavy uphill hauling through mud and sand in such work as logging, mining and earth moving, add to the problem of engine cooling. Such equipment is subject to sever shocks and vibration, dirt and weather exposure, all of which speed up the deterioration of the cooling system and the loss of cooling efficiency.

To keep the cooling system constantly in repair and in the best working order requires the most careful attention to periodic preventive maintenance services by the mechanic. The operator of the equipment is the most important single factor in preventive maintenance. Only through him can the mechanic ever hope to know what trouble a piece of equipment is giving. Practically all cooling system troubles can be detected in their early stages before they seriously affect vehicle operation and while they are still easy to correct. The two most important indications of cooling system conditions are coolant operating temperature and coolant level. Therefore, the operator preventive maintenance services to the cooling system should always be concentrated on these two as first requirements.

While all other operator preventive maintenance services, such as for leakage or defective mechanical conditions of parts, are also necessary, these conditions are nearly always indicated by the engine temperature gage, by level of coolant in the radiator, or by both. Frequent observation of the engine temperature gage during operation is a primary service for detecting overheating or overcooling of the engine in the first stages, before serious trouble develops. Excessively high temperature will cause loss of power and will also result in damage to bearings and other moving parts. Cylinder heads and engine blocks are often warped and cracked by terrific strains set up in the overheated metal, especially when coolant is added immediately afterward without allowing the engine to cool.

H. G. Smith's background in diesel engineering renders his articles of great interest to those engaged in operation and maintenance of high-speed engines. From the Springfield, Ohio, Technical and Engineering school, he entered the Foos Gas Engine Company, Springfield and later, Springfield Motor Truck. With this experience behind him, he joined Hercules Motors Corporation, where he was chief engineer for many years being with them when their diesel program was started. Executive engineer for Buda during the last ten years, he recently resigned to take up consulting work.

Overheating first causes the coolant to boil. If the engine is operated with boiling coolant, steam pressure forces large quantities of coolant out of the system through the radiator overflow pipe. More violent boiling then occurs, and still more coolant is lost. Finally, coolant circulation stops and cooling fails completely. This means that operating an engine with the coolant boiling for even a short period may be actually driving that engine to destruction.

Although less sudden in effect than overheating, overcooling may be equally dangerous to the engine. Low engine operating temperature, especially during freezing weather, results in excessive fuel consumption, dilution of engine oil by unburned fuel, and formation of sludge from condensation of water in cylinders and crankcase. Lubrication failure may follow sludge formation and lead to serious engine damage. Burned fuel vapors also mix with water in the crankcase and form corrosive acids which attack engine parts.

To avoid overheating difficulties, the operator must be constantly alert to see that the temperature gage does not exceed the maximum safe operating temperature specified. Whenever the gage registers above this temperature, the engine should be stopped and the cause investigated and corrected before further operation is attempted. It is also important to watch the gage for a sudden rise in temperature during engine warm-up as an indication of defective cooling. To prevent overcooling difficulties, keep any necessary warm-up period before operation as short as possible, and avoid continued operation of the engine if the temperature gage does not reach the minimum safe operating temperature specified for the equipment.

When checking for either overheating or overcooling, the possibility of a false temperature indication from a defective gage should not be overlooked. Prevention of both overheating and overcooling difficulties thus requires temperature gage observations both before and during operation. It also requires a positive knowledge by the operator of the highest and lowest safe operating temperatures specified for the equipment.

The level of coolant in the radiator is the starting point for proper cooling check-up. Coolant level should be checked accurately as well as frequently for the three separate purposes: (1) to make sure the system always contains enough coolant; (2) as a guide to cooling system condition; and (3) to avoid overfilling. Be careful when removing radiator filler caps from equipment with hot engines. Pressure caps should be removed as follows: Remove cap slowly, turn in direction of arrow until it reaches vent position. If escaping steam is heard, take hand away from cap until the noise stops. After pressure is released the cap can then be removed safely.

As previously stated, low coolant level may prevent proper circulation, especially at lower engine speeds. At higher engine speeds it will allow a large volume of air to become mixed with the liquid. Air bubbles in the coolant not only reduce the capacity of the coolant to carry away heat, but also promote rapid rust formation and corrosion and may cause excessive foaming and coolant loss out of the overflow pipe. In any case, coolant shortage leads to overheating and engine damage. The second reason for checking coolant level is less generally understood. In the cooling system equipped with a radiator pressure cap, very little

coolant should be lost through evaporation or from any other cause if the system is clean, leakproof, and in proper working order. Therefore, any unusual coolant loss over a period of normal operation may indicate an improper condition within the system. Any such condition should be located and corrected before it causes serious trouble. Any unusual increase in the amount of coolant needed to bring the level up to standard level should be investigated.

If the radiator is continually filled above specified level or when the engine is not up to safe minimum operating temperature, any change in the level or the quantity of coolant additions will be of little value as an indicator of cooling system conditions. Both water and antifreeze expand when heated and if there is not enough space left in the radiator for this expansion, some coolant will be lost through the overflow. Overfilling the radiator while using water results in dilution and weakening of the corrosion inhibitor solution. Unnecessary additions of water increase water scale deposits which interfere with removal of heat from the engine. Overfilling also wastes antifreeze and when a system containing antifreeze is overfilled with water, it may lead to a freeze-up.

Leakage is probably more common in the automotive off-highway vehicles than in stationary installations due to the stresses and strains set up in the joints and connections by wide changes in coolant and metal temperatures especially during cold-weather operation. Engine vibration, road shock, and deterioration of gaskets and wear, breakage and corrosion of parts may create leakage. These conditions are often more severe in the heavy duty equipment. The pressure caps create additional pressure in the system, thereby increasing the leakage tendency at hose connections and other water joints. Radiator leakage may be caused by accidental damage to the core from flying stones or minor collisions. Such damage can easily occur without the operator's knowledge. Small coolant leaks, which show dampness or even dripping when cold, may not be noticed when the engine is hot, due to rapid evaporation of the leakage. Leakage of ethylene glycol antifreeze may be easier to find because it evaporates much more slowly than water or alcohol. Rusty or grayish-white stains at joints are usually indications of leakage, even though there appears to be no dampness. Even small leaks should not be neglected, since they often become larger, sometimes suddenly, and generally while equipment is being operated. The primary function of the radiator is to transfer heat efficiently from the coolant to the air. This is not possible without clean, straight air fins and unobstructed air passages. Flying dust, sand, grass, leaves and other debris may clog air passages in a very short time. Air fins are easily bent and damaged by impact of small stones and from other accidental causes. The problem of maintaining sufficient air flow through the radiator is often further complicated by radiator grilles, air screens, shutters, etc. Therefore constant attention to the condition of all air passages and restrictions is required in order to avoid the danger of overheating. In extreme cases, cleaning may be required daily or even oftener.

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Aerofin finned surface jacket-water cooling installation, La Gloria Corporation, Falfurrias, Texas. Designed to cool 334,200 gallons of water per hour from 155° to 145° using 100° ambient air. Heat transfer 27,850,000 BTU/hr. Engineered and built by Hudson Engineering Company.

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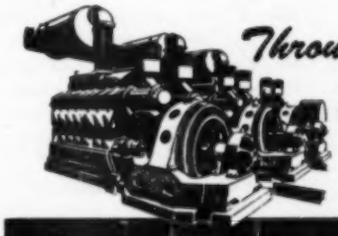

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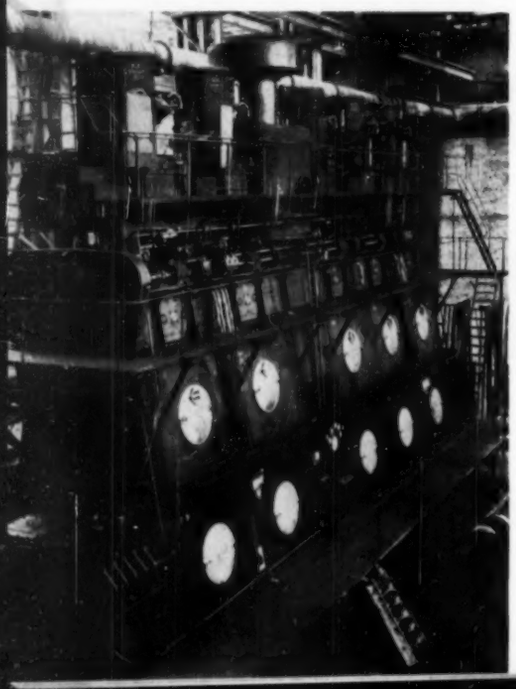
WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **HAMISH FERGUSON**

Hamish Ferguson was appointed Secretary to the Diesel Engine Users Association in London in 1944. Previously senior technical assistant to Diesel and Insurance Consultants, London, and for several years with English Electric Company in the designing and erection of large diesel generating plants. Mr. Ferguson continues to do independent consulting work.

THE production of diesels in the United Kingdom continues to be stepped up, as is shown by figures released by the Ministry of Supply and the Central Statistical Office. The total horsepower of industrial type engines produced was, in 1948, 1,377,121 bhp., and in 1949, 2,123,470 bhp., an increase of 54 per cent. The equivalent figures for marine types were, in 1948, 404,013 bhp., and in 1949, 442,024 bhp., an increase of 9½ per cent.

Leyland have devised and built a test plant whereby the conditions of a tropical rainstorm can be stimulated and this is used for checking the weatherproof qualities of their buses and the driver's cabs of goods vehicles. The plant consists of a 20-foot high girder framing resembling the skeleton of a large box with one open end. Along the sides, top, and one end are lengths of piping in which spray holes, 3/32-inch diameter, are drilled every 2 feet. Water is forced through the spray holes at a pressure of 100 psi. to bombard the vehicle from all angles at a distance of about 3 feet. The inspectors record from the inside of the buses any defects or leaks.



The North-of-Scotland Hydro-Electric Board, who, though affiliated with the British Electricity Authority, maintain their own Scottish administration, are well advanced with their projects for the utliization of water power from the available sources in the Highlands. Yet it would not prove economical to supply electricity from the maid "grid" system to the outlying islands by means of submarine transmission lines. Many diesel generating plants have now been installed in the Isles, and the newest project is a station at Kirkwall, in the Orkneys, to have a capacity of 7,000 kw.

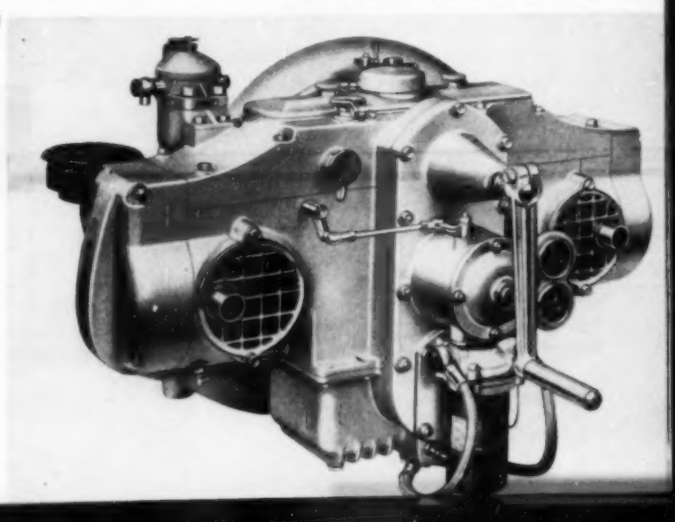
Reference has been made from time to time in this page of the Doxford opposed-piston two-cycle marine engine which has been favored by a number of well-known British shipbuilding companies for use as main propulsion units in the larger ocean-going ships. The illustration of a 5-cylinder engine of this type, on the test-bed, is typical of the many that are now in regular service throughout the world. The output is 5,150 bhp.

Now that the new oil refineries in England are coming into production, research engineers in the laboratories and engine-builders' test shops are devoting considerable attention towards the utilization of lower grade fuels than those which have currently been available. Having been accustomed to using distillate fuels having a sulphur content around 0.2 per cent or less, with the introduction of Middle East crudes, the fuel now generally supplied to the engine user in the United Kingdom has an increased sulphur content of around 0.8 per cent and it is predicted that this will probably rise to 1.5 per cent or more. The effects of high sulphur fuel in respect of engine fouling and wear are being investigated on engines of all sizes, from the slow-speed marine type to the high-speed two-stroke uniflow engine and considerable success is being experienced providing operating temperatures are kept to a high level throughout, and continuously. Where intermittent running is required, many engineers hold the view that the ultimate solution will rest with the lubricating oil manufacturers who can introduce special additives to combat acid erosion.

Another problem engaging the attention of research engineers is that of successfully consuming boiler fuels in the modern high-speed engines, using fuels having a viscosity of around 2,000 seconds Redwood No. 1 at 100°F., the first essential is to preheat the fuel before it is fed to the fuel pumps in order to lower the viscosity. When considering the actual combustion of the fuel in the cylinders it appears that the high carbon content may be of greater significance than high sulphur. All this research is going on, not only to insure the efficient use of fuels distilled from Middle East crudes in the Untied Kingdom itself, but also to insure that British engines exported to overseas countries will be capable of running satis-

. . . and now please turn to page 64 . . .

Five-cylinder, 2-cycle, opposed piston Doxford 5,150 bhp. installed in diesel vessel *LaCordillera.*



Compact Enfield twin-cylinder diesel industrial engine.

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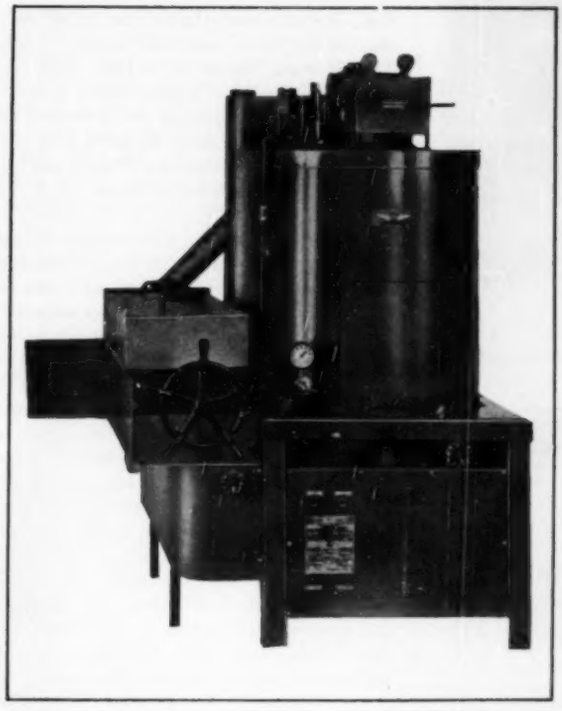
You get it with Youngstown-Miller Re-Refiner!



Oil never wears out!

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Here's how the YM Unit Charge Oil Re-Refiner works. Dirty oil is mixed with adsorbent earth, agitated and subjected to carefully controlled electric heat. After volatile contaminants have been driven off, the oil and earth are forced into a two-stage filter press, where all solids, including the adsorbent material, are removed. Oil refined by YM Unit Charge Re-Refiner is completely free of dissolved impurities, liquid contaminants of high boiling point and suspended impurities.

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Actual letters from satisfied users prove that restored oil protects machinery . . . curbs costly shutdowns . . . reduces repair bills . . . and THAT SAVINGS ON OIL PURCHASES SOON PAY FOR COST OF YM RE-REFINER.

Simple and Effective for:

DIESEL ELECTRIC PLANTS • DIESEL POWERED SHIPS • RAILROADS
ENGINE BUILDERS • FLEET OPERATORS • INDUSTRIAL PLANTS

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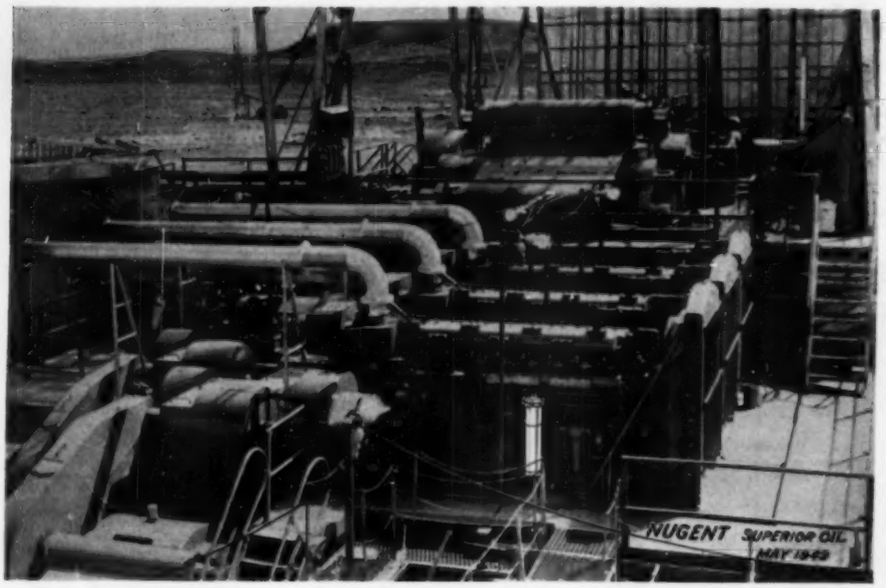

When you're making hole looking for oil, down time is a very expensive luxury. That's why Nugent Filters are used on so many drilling rig engines. The rig illustrated above is a good example —located in southwestern Wyoming at the time the photograph was made, the rig is one of the largest in the world. The three Superior supercharged dual-fuel engines deliver 2,010 combined horsepower and each is equipped with a Nugent depth type pressure lubricating oil filter.

It's in installations like this where efficient, dependable Nugent filtering pays the biggest dividends, but regardless of the type of installation, Nugent filters will pay for themselves in reduced oil consumption, longer equipment life and peace of mind.

Write today for descriptive literature which tells how you can utilize all these Nugent advantages. An outline of your filtering problem will bring specific recommendations.

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Wm. W. Nugent & Co., Inc.

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Established 1897

OIL FILTERS, OILING AND FILTERING SYSTEMS, TELESCOPIC OILERS, OILING DEVICES, SIGHT FEED VALVES, FLOW INDICATORS

Representatives in Boston • Cincinnati • Detroit • Houston • La Jolla, Calif. • Los Angeles Minneapolis • New Orleans • New York • Philadelphia • Portland, Ore. • San Francisco Seattle • St. Louis • Tulsa • Representatives in Canada: Montreal • Toronto • Vancouver

ENGLAND...

continued from page 62 . . .

factorily on the local fuels available, wherever they may be sited.

Enfield Industrial Engines Co. produce a range of air-cooled diesels particularly suited for small marine and industrial uses. A twin-cylinder Model H.O.2 was recently inspected when undergoing a 500-hour endurance test on full-rated load. Operation was remarkably quiet and the performance figures exceeded those claimed by the makers. The brief specification is: bore and stroke, 85x100 mm.; capacity, 1,135 cc.; compression ratio, 19.5:1; output at 1,500 rpm., 13 bhp.; fuel consumption at 1,500 rpm., 0.39 pints bhp./hr.; speed range, 1,200 to 1,800 rpm. Cylinders are made from heavily finned, low expansion aluminum alloy with cast-in liners of special iron; cylinder heads are of similar material with cast-in valve seats, combustion chamber and ports. Pistons are of silicon alloy with floating gudgeon pins. Engine cooling is effected by means of a fan mounted on the flywheel and displacing 900 bu. ft. of air per minute; the air is taken through volutes to each cylinder and head and directed over the hottest points.

It is with regret that the writer records the passing, during recent months, of two early pioneers in the diesel field who were well known to him and with whom some readers may have been acquainted. G. E. Windeler joined Mirrlees, Bickerton and Day towards the end of the last century and was directly responsible for the early testing of the first Mirrlees diesel and the development of their later engine types. P. H. Smith, after working on diesels with Carels, Sulzers and M.A.N., became manager of the Diesel Engine Company in 1902 and played a direct part in the installation and operation of the diesels he had studied and which were at that time being manufactured under license by British engine builders. Each of these men subsequently became independent consultants and continued their interest in diesels till the end. The part that such pioneers have played in aiding the development of the modern diesel as we know it today can hardly be overstressed.

VENTILATE DIESEL CRANKCASES

. . . *continued from page 43 . . .*

urally found its way through this end of the crankcase and by-passed the forward end where the air compressor was located. Consequently an explosive mixture formed at the forward end, and here the explosion occurred when the air compressor piston seized and produced an igniting spark. If several air intakes of adequate size had been provided from end to end of the crankcase it would have been completely ventilated and there would have been no explosion.

Except for such elaborate expedients as filling the crankcase with an inert gas like nitrogen, the only sure way of preventing crankcase explosions seems to be to circulate lots of air through the entire space. Let's ventilate diesel engine crankcases!

SAFETY SIGNAL FOR BRAKES

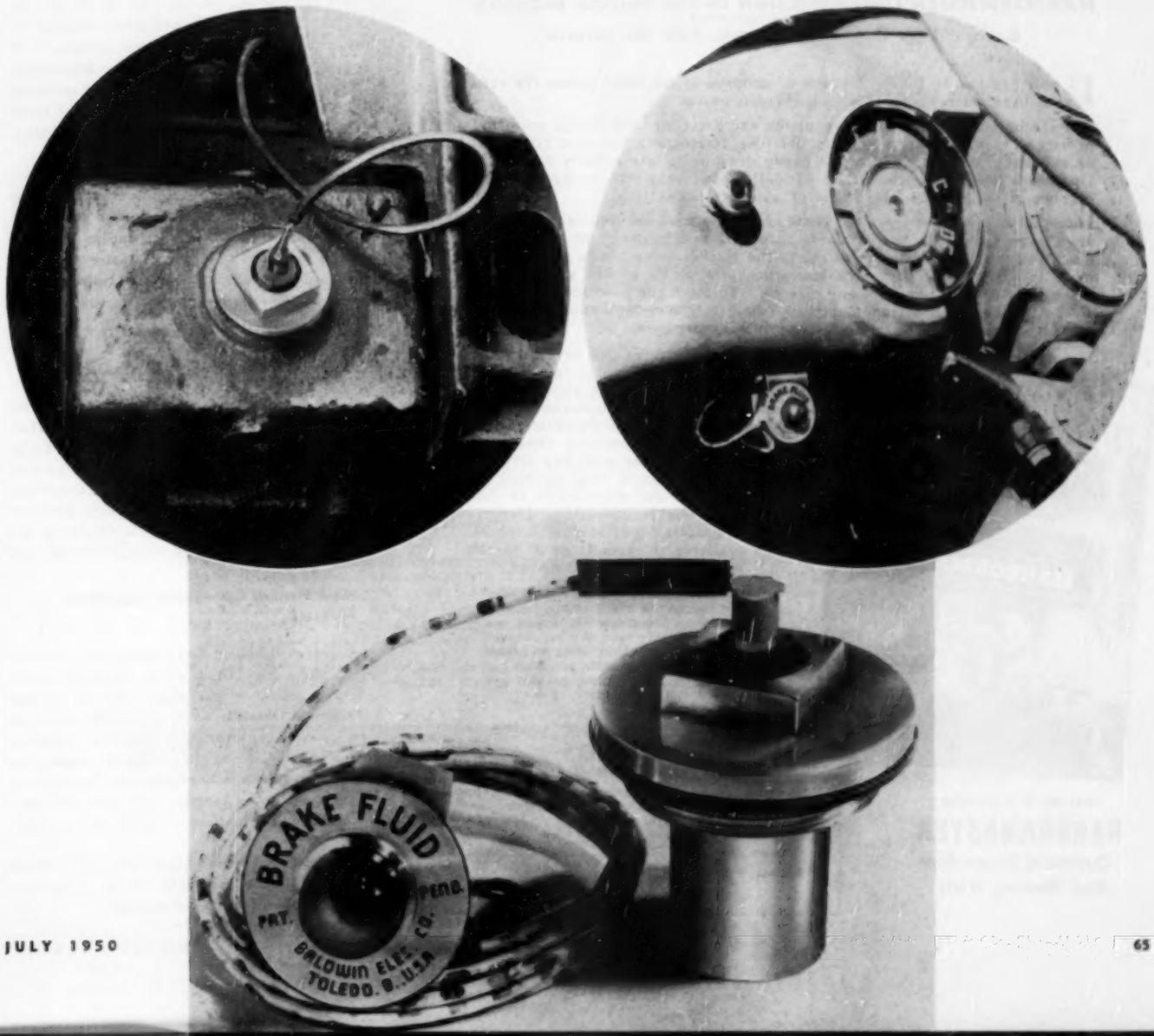
When Brake Fluid Is Low—When a Brake Line Breaks—The Answer Is a Real Driving Hazard. Here Is a New, Efficient Safety Signal

MOTOR transport companies, who study every accident in their fleets, place brake failure as one of the top three causes of road crashes. Why? Because bad brakes don't show up until it's too late. The instant a tire goes the motorists can stop. But an empty fluid cylinder gives no notice—just leaves the driver helpless on a curve or hill, at a school crossing, a highway light, or a railroad. So it isn't entirely the fact the brakes are bad that makes the accidents, it's the fact that the driver doesn't know in time that they are bad. The really important thing is a little advance notice. An instrument on the panel or a flashing light to warn the driver.

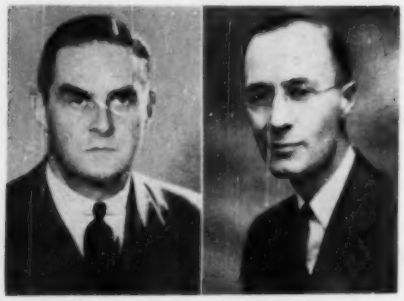
The Whitney Signal flashes a warning on the instrument panel as soon as the brake fluid gets low. When the red light comes on it's time to check—it's time to be careful. If it's a slow leak there may be many miles of service still in the system—but if it's a line break or a loose fitting the brakes may go out at once. In any event, the driver who gets the red signal is prepared for anything.

Mechanically the Whitney Signal is simplicity itself. Imagine a little plug the size of a shotgun shell that replaces the filler cap in your fluid reservoir. In the shell is a float like a carburetor. A single wire leads to a red light on the dash. As long as there is adequate fluid in the chamber the red button is dark. But as the fluid level drops, from a leak, a broken line, or a faulty fitting the button lights up and stays lit until the fluid level is restored.

Transport companies know from experience that brake fluid gets away and that brake accidents are serious ones. So they check the fluid frequently. It's a slow job. The floor board has to come up. The filler cap is removed. The fluid measured and renewed, and everything replaced. The only reason they do all this is to catch trouble before it happens. The Whitney Signal is manufactured by the Baldwin Electric Co.



Cooper-Bessemer Elects Two New Directors



W. E. Stevenson Ralph L. Boyer

At the recent annual meeting, Cooper-Bessemer shareholders elected to membership on their board of directors Ralph L. Boyer and William E. Stevenson. Mr. Boyer is presently vice president and chief engineer of Cooper-Bessemer. Mr. Stevenson is president of Oberlin College, Oberlin, Ohio. Long recognized as a leading design authority in the diesel, gas engine and compressor fields, Mr. Boyer has been more recently associated with pioneering such notable developments as the gas-diesel or dual-fuel engine, Turboflow and the supercharging of 4-cycle spark-ignited gas engines. Graduate BME from Ohio State University in 1924, Mr. Boyer received his ME degree in 1930. He started his design career with Cooper-Bessemer in 1926 as diesel engineer, later to become assistant chief engineer, then chief engineer until his election to vice president and chief engineer in 1947.

Mr. Boyer is a member of the Society of Automotive Engineers and the American Society of Mechanical Engineers. He has also been elected to the honorary fraternities of Sigma Xi, Tau Beta Pi, Eta Kappa Nu and Pi Mu Epsilon. The selection of Mr. Stevenson by Cooper-Bessemer shareholders was based on the valuable counsel that his background and experience can give to Cooper-Bessemer on various aspects of the company's business, and particularly in the field of public relations.

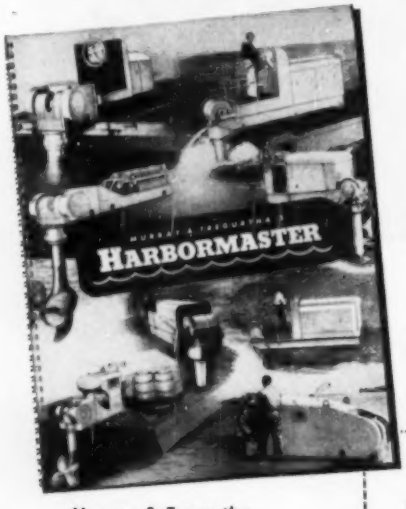
OUTBOARD PROPULSION UNITS CAN SAVE YOU MONEY

Compare the Money-Saving Performance of the HARBORMASTER Outboard Unit in the Marine Industry Before You Build, or Before You Re-power

IT will pay you to investigate the advantages of *outboard* power the very next time marine motors are up for discussion.

The Harbormaster Outboard Propulsion and Steering Unit brings powering of barges, towboats, tugs, lighters, derricks, ferries, etc. to a new high peak of efficiency. Hundreds of these heavy duty units are in daily operation. Operators are saving thousands of dollars in many marine applications because of the natural advantages of outboard propulsion.

How fast can you get there, and how much pay load can you carry? These are the questions you need to have answered, and in the great majority of cases you will find the best answer in the Harbormaster. You get the ultimate in maneuverability with Harbormaster, which allows you to steer instantly with full power in any direction, through the patented M&T 360° Propeller Thrust Steering Control. You get tremendous savings in fuel expense because you have more thrust per horsepower.



Important features that save time and money include exclusive 180° Elevating Mechanism which allows 1-man operator to easily maintain and service the equipment; and Patented Shear Pin, which automatically shears off should underwater assembly strike a submerged obstacle, thus opening up vast new shallow water fields to continuous, reliable operation. Harbormaster models, for all marine purposes, are available in sizes from 20 to 300 h.p. engines, gas or diesel power.

You'll find this data, and further valuable information, in our comprehensive catalog containing over 70 photos and diagrams. Gladly sent you on request, whether you have immediate or future use for Harbormaster units. Why not write for the catalog *now* so that you will have full information on file?

Murray & Tregurtha
HARBORMASTER
Outboard Propulsion And Steering Units

Murray & Tregurtha, Inc.
6 Hancock St., Quincy 71, Mass.

Please send catalog, without obligation, covering the HARBORMASTER Outboard Propulsion and Steering Unit.

Name .....
Company .....
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Sales Manager of Winslow

W. Ray Kern

Appointment of W. Ray Kern as sales manager of Winslow Engineering Company, manufacturers of Winslow filters and elements, has been announced by Wm. G. Nostrand, vice president in charge of sales and engineering for the Oakland, California, firm. Mr. Kern assumed his new duties on May 15 after resigning as vice president and general manager of Berglund Tractor and Equipment Company. He had spent the past 15 years with the Berglund organization, which under his leadership had become one of the most successful distributors of Caterpillar tractors and P & H excavators in the nation.

Mr. Kern's long experience in the field of heavy machinery and affiliated industries dates back to positions which he held in prior years with Enterprise Engine and Foundry Company and with Frisco Standard. While with the latter concern, he was associated with Charles A. Winslow, founder and president of the company for which he will now be in charge of sales.

Hudson, Mass., Orders Large Diesel

Nordberg Manufacturing Company has just announced closing an order with the City of Hudson, Massachusetts, for a 10-cylinder, 2-cycle 21½x31-inch diesel rated 4,250 bhp. at 225 rpm. This crosshead type engine is to be direct connected to a 3,000 kw. General Electric alternator and is scheduled for shipment in October of this year and to go on line in December of this year.

New Firm of Consulting Engineers Formed

Recently announced is the formation of the firm of Hill-Johnson Engineering Company, Lake Odessa, Michigan, with Messrs. Harry O. Hill and Robert S. Johnson as the principles. This new company will specialize in consulting, designing and development of diesel engines, combustion chambers, fuel metering equipment, hydraulic devices and power controls. The firm announces that complete drafting service is also available.

Both Hill and Johnson have had many years experience in the diesel field and are prepared to offer prompt and efficient service.

STANDARD ENGINEER'S REPORT

RPM DELO

TEST DATA

LUBRICANT *RPM Delo Supercharged Lubricating Oil*

UNIT *Caterpillar Diesel-D17000-V8 Cyl.*

CONDITIONS *Cont. High load-actual field oper.*

FUEL *Commercially available Diesel Fuel*

TEST PERIOD *4 months*

FIRM *Homer Jones Ranch, Chandler, Ariz.*

Stopped all ring sticking where ordinary oil failed!

AFTER ONLY 625 HOURS operation on an ordinary heavy-duty type oil, an engine pulling 90% of full load rating had 39 stuck rings—only 9 of its 48 rings were free and several were broken. There were heavy lacquer and carbon deposits in ring grooves and on piston-skirts, as indicated by this unretouched photograph of one of the pistons. Besides stuck rings, note clogged oil-return holes and oil rings.

OPERATED 1582 HOURS — more than twice as long — on RPM DELO Supercharged-2 Lubricating Oil, the same engine, running under the same load and fuel conditions, stayed efficient and clean, as this unretouched photograph shows. At the end of test all 48 rings were free, with no piston-skirt deposits. Ring-groove deposits were 50% less. Note how RPM DELO Supercharged-2 kept oil-return holes open.

REMARKS: RPM DELO Supercharged-2 Lubricating Oil is one of four grades in the RPM DELO Oil line. It solves operating problems in both Diesel and gasoline engines, especially where load conditions are extreme.

Its detergent prevents carbon and lacquer deposits on all parts, even with high sulphur-content fuels.

RPM DELO Supercharged-2 Oil sticks on hot and cold surfaces — reduces wear under the heaviest loads. (Cylinder-wear averaged only 0.0014 inches per 1000 hours with RPM DELO Supercharged-2, while with the ordinary oil it was 0.0043 inches — three times greater.) RPM DELO Supercharged-2 Lubricating Oil also contains special compounds that resist oxidation and sludging, prevent bearing corrosion and internal rusting, and stop foaming.

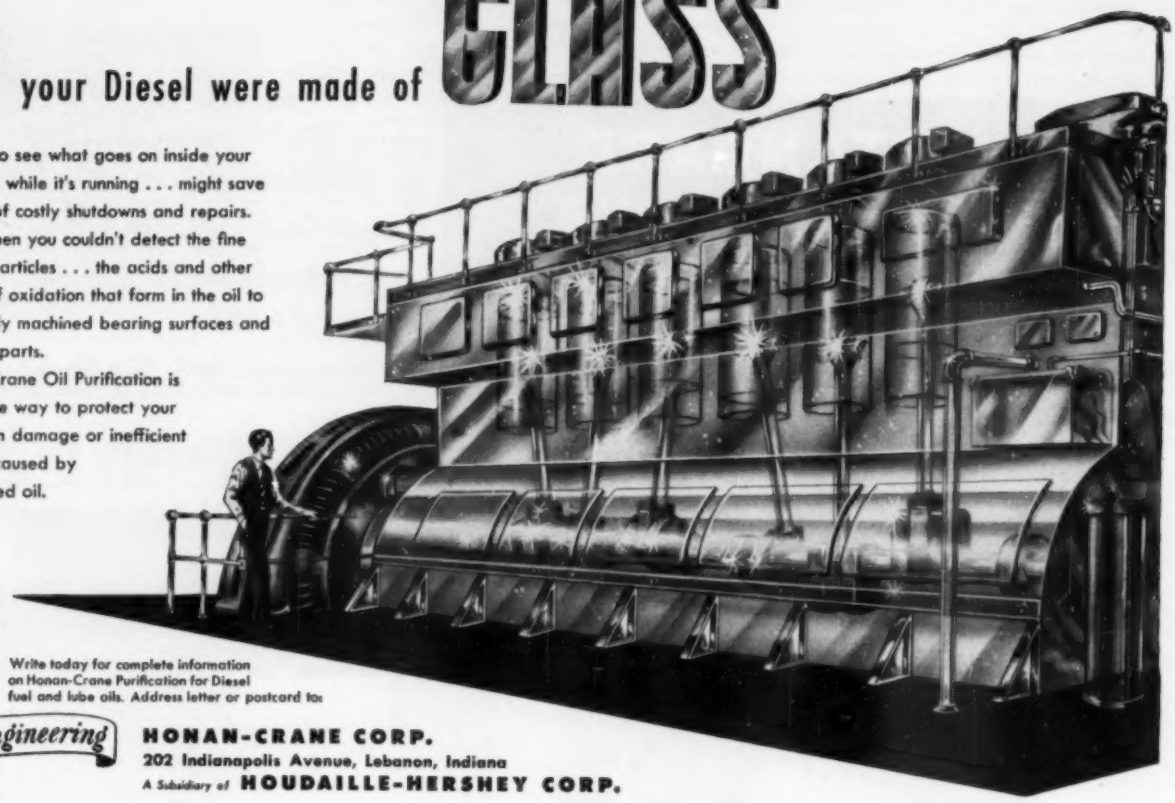
FOR MORE INFORMATION about the proper grade of the new RPM DELO Oils to fit your particular requirements, or the complete line of RPM Lubricants, and the name of your nearest "RPM" Distributor, write or call any of the companies listed below.

STANDARD OIL COMPANY OF CALIFORNIA • San Francisco | STANDARD OIL COMPANY OF TEXAS • El Paso, Texas
THE CALIFORNIA OIL COMPANY • Barber, N. J., Chicago | THE CALIFORNIA COMPANY • Denver, Colorado

if your Diesel were made of GLASS

A chance to see what goes on inside your engine . . . while it's running . . . might save you a lot of costly shutdowns and repairs. But even then you couldn't detect the fine abrasive particles . . . the acids and other products of oxidation that form in the oil to attack finely machined bearing surfaces and other vital parts.

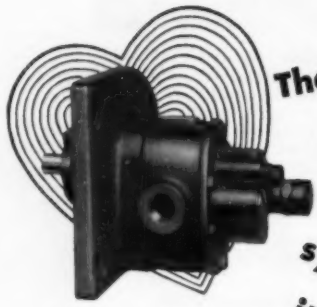
Honan-Crane Oil Purification is the one *sure* way to protect your engine from damage or inefficient operation caused by contaminated oil.



Write today for complete information on Honan-Crane Purification for Diesel fuel and lube oils. Address letter or postcard to:

Clean Oil Engineering

HONAN-CRANE CORP.
202 Indianapolis Avenue, Lebanon, Indiana
A Subsidiary of **HOUDAILLE-HERSHEY CORP.**



The HEART of a diesel lubricating system is its PUMP

Rotary geared pump with special flange mounting becomes integral part of diesel engine when installed. Note opening above relief valve for tachometer.

Modern diesel operation generally requires a pressure lubricating system — and the vital element is the pump. Thousands of Brown & Sharpe pumps are now providing reliable service month after month without interruption, for lubrication, transfer, or booster systems. Available with various types of flange mountings and special internal construction to meet specific requirements. Write for catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

We urge buying through the Distributor

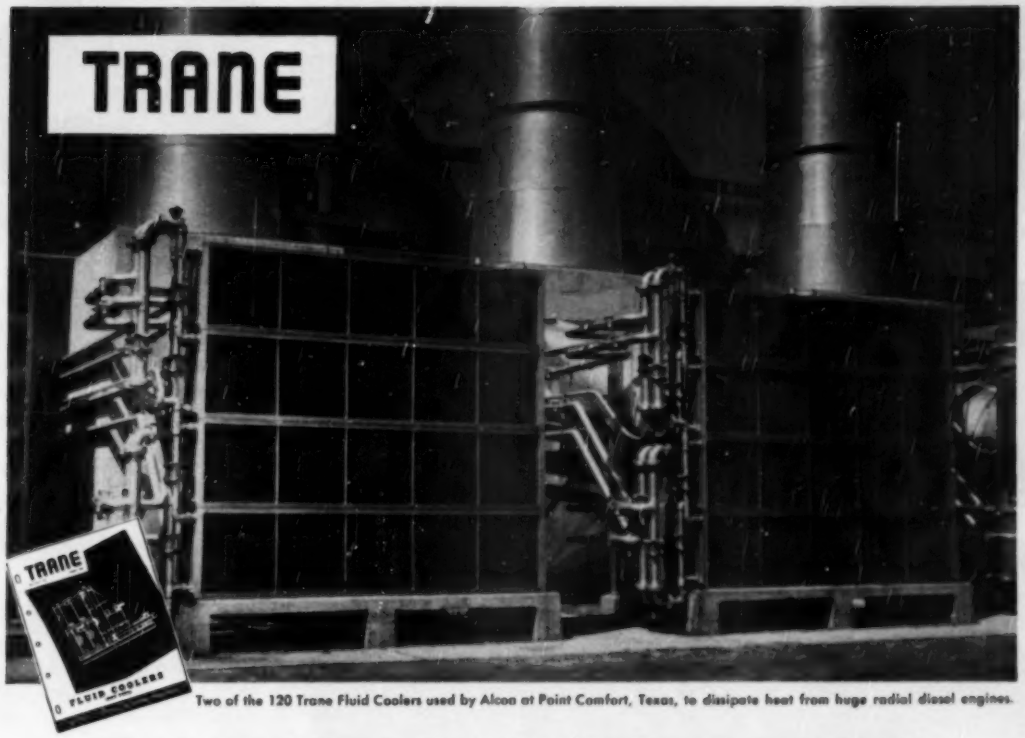
BROWN & SHARPE BS

SCIENCE IN THE FOUNDRY explains and illustrates the foundry techniques which have been developed to combine science with craftsmanship. It demonstrates how controls and high standards at Campbell, Wyant and Cannon Foundry Company make possible the casting uniformity so necessary to the Diesel industry of today. It tells you of our metallurgical advancements that lead to new freedom for the design engineer. It contains charts of physical properties and typical applications which simplify the selection of metals for your castings. Write for your free copy today.

Campbell, Wyant and Cannon Foundry Company MUSKEGON, MICHIGAN

CWC

CAMPBELL, WYANT AND CANNON FOUNDRIES
MUSKEGON, MICHIGAN
Henry Street Plant • Sanford Street Plant • Broadway Plant
LANSING, MICHIGAN • *Centrifugal Fusing Co.*
SOUTH HAVEN, MICHIGAN • *National Motor Castings Div.*



Two of the 120 Trane Fluid Coolers used by Alcoa at Point Comfort, Texas, to dissipate heat from huge radial diesel engines.

New Cost-Reducing Method of Air-Cooling Gases & Liquids

The new Trane dry type Fluid Coolers cool either liquids or gases in a closed system using air as the cooling medium.

Available in two models and a complete range of sizes, the application of these versatile units is limited only by the ranges of air cooling and the consistencies of liquids to be cooled.

Solving Alcoa Engine Cooling Problem

At the Point Comfort, Texas, reduction plant of Aluminum Company of America, 120 Trane Fluid Coolers solved a difficult cooling problem created by Alcoa's 216,000 h.p. radial internal combustion engines.

Similar units are also economical problem-solvers for cooling jacket water and lubricating oil from diesel, gasoline or gas engines, water used with shell-and-tube heat exchangers, quenching oil; gases such as natural gas, carbon dioxide, propane, freon and other refrigerants. The list of applications is endless.

Complete data for selection, specification and installation of Trane dry type Fluid Coolers is contained in Bulletin DS-395.

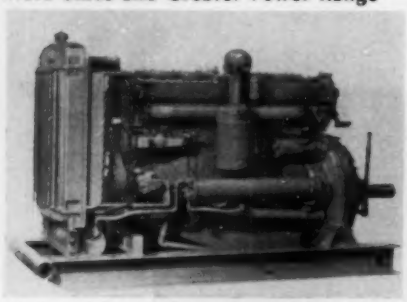
THE TRANE COMPANY...LA CROSSE, WIS.

EASTERN MANUFACTURING DIVISION, SCRANTON, PA.

Manufacturing Engineers of Heating, Ventilating and Air Conditioning Equipment—Unit Heaters, Convector-radiators, Heating and Cooling Coils, Fans, Compressors, Air Conditioners, Unit Ventilators, Special Heat Exchange Equipment, Steam and Hot Water Heating Specialties ... IN CANADA, TRANE COMPANY OF CANADA, LTD., TORONTO.

The standard line of Trane Fluid Coolers consists of the EC series—14 sizes, fan diameters from 18" to 120" (left and right). The GC series—8 sizes with fan diameters from 72" to 144".

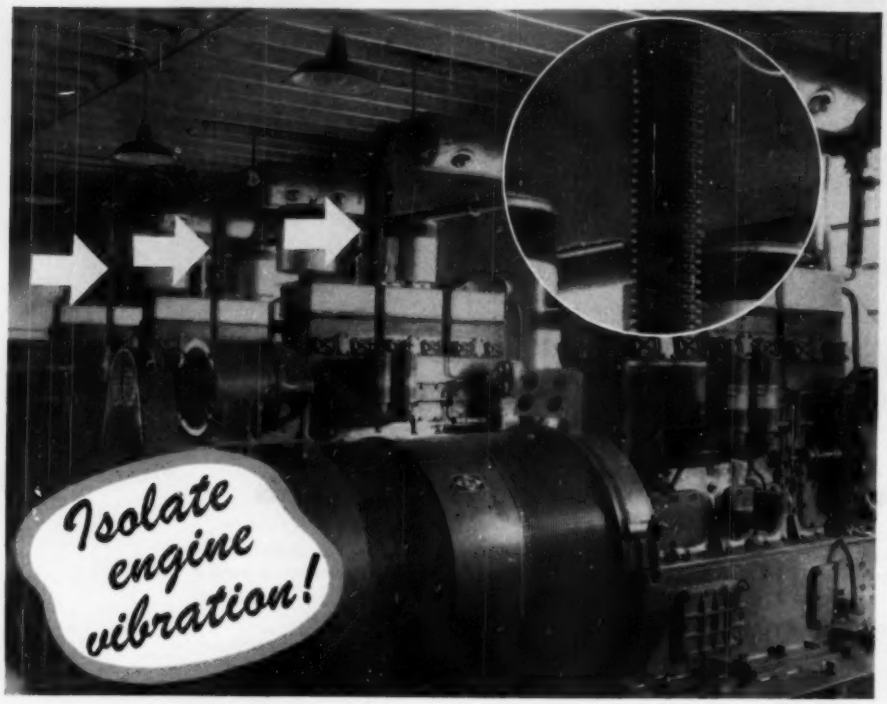
More Sizes and Greater Power Range



The Murphy Diesel Company, Milwaukee 14, Wisconsin, has recently announced certain refinements in design which are claimed to provide more power, greater economy, greater dependability and longer life. At the same time the number of models has been increased. Five 4-cylinder models and six 6-cylinder models ranging in output from 90 to 200 hp. are now available. The Murphy principles of "true" diesel operation, plain open combustion chamber, four valves per cylinder, hydraulic servo-type governor, etc., remain as the basis of the design of the engines, the additional power output resulting from improvements in the application of these principles. Literature giving full information is available from the manufacturer.

New Method of Silver Plating

A new method of silver plating high amperage electrical connections on the job has been developed by The Cool-Amp Company. The new product is especially desirable for improving continuity of electrical service and reducing maintenance time and costs as it offers a quick and easy solution to the problem of heating due to oxidation. Cool-Amp silver plating powder deposits a genuine coat of silver that will not peel off and gives cool maximum conductivity for copper, brass or bronze contacts. The only equipment needed is a sharp steel wire brush or abrasive cloth, clean rag and water. A pound of Cool-Amp powder will silver plate approximately 6,000 square inches, making the unit cost very low, as it retails for $11.50 per 1-pound bottle, prepaid. It is being used extensively by large industrial plants such as Anaconda Copper Mining Co., Hershey Lumber Products, Ohio Edison Co., Florida Power & Light Co., and many others. For further information write DIESEL PROGRESS, File 14, P. O. Box 8458, Los Angeles 46.



with CMH FLEXIBLE CONNECTORS for INTERNAL COMBUSTION ENGINES

In new installations or existing ones, CMH all-metal flexible connectors will isolate engine vibration from fixed exhaust or air intake lines. They will also absorb expansion or contraction and correct for misalignment. Leak-tight and fatigue resistant, CMH flexible metal connectors give long, dependable, *maintenance-free* service.

Available in steel or stainless steel in sizes from 1" to 30" I.D. Standard assemblies are made with pipe nipples, couplings, fixed or floating flanges as required. Write for full details and specification sheets.

The illustration above shows CMH Flexible Connectors installed in the exhaust lines of these diesel-electric generating sets.

Other CMH Assemblies for Internal Combustion Engine Service

CMH REX-WELD Corrugated Flexible Metal Hose with or without metal braid covering is pressure and vacuum tight and serves as an ideal flexible connector for lines conveying fuel, air, water, oil, etc. Available in sizes from 3/16" to 4" I.D.

CMH FIRE PROOF Flexible Metal Hose is available for installation where the ultimate in fire protection is required. Sizes 5/16" to 8" I.D.

Write for descriptive literature.

CMH—ONE dependable source for every flexible metal hose requirement

• CMH manufactures all standard types of flexible metal hose, both convoluted and corrugated, in a variety of metals; expansion joints for piping systems; stainless steel and brass bellows; various conduits and special assemblies of these components.

CHICAGO METAL HOSE CORPORATION

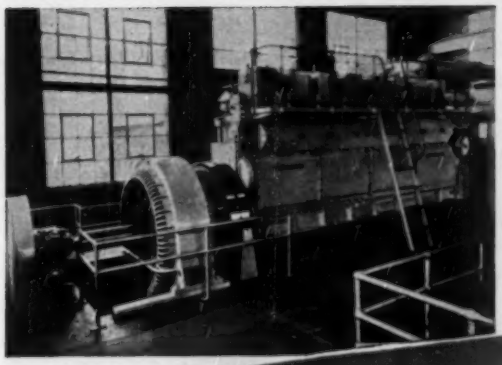
Leaders in the Science of Flexonics
1325 S. Third Avenue
MAYWOOD, ILLINOIS
Plants at Maywood, Elgin and Rock Falls, Illinois
In Canada: Canadian Metal Hose Co., Ltd., Brampton, Ontario

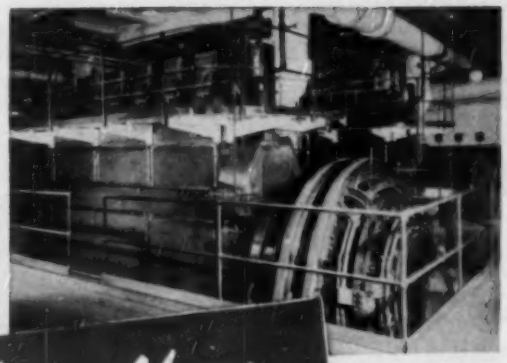
New Handy Tool

A tool for retrieving nuts, bolts, etc., dropped into inaccessible spots, is announced by the Herbrand Division, Bingham-Herbrand Corp. It is their new Magnetic Pick-Up tool. Amazingly strong permanent magnetic head is 3¼ inches long, ½-inch in diameter, and picks up tools to 2½ lbs. Head is adjustable to any angle to reach around corners and get under and behind obstacles. Knurled safety grip handle extends from 16⅜ to 27 inches. The Magnetic Pick-Up tool weighs only 8 ounces and is durably made to the highest quality standards. It is a real mechanics tool, and is a time-saver in every garage or service station. For further information write DIESEL PROGRESS, File 31, P. O. Box 8458, Los Angeles 46, Calif.

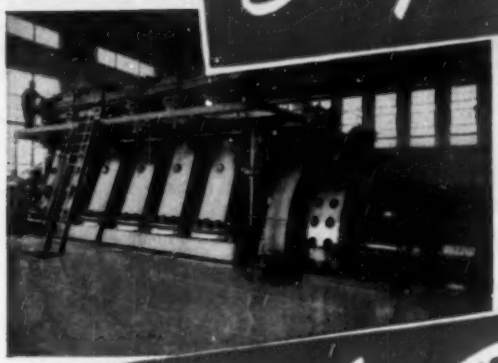
Purolator Now Located in New Plant

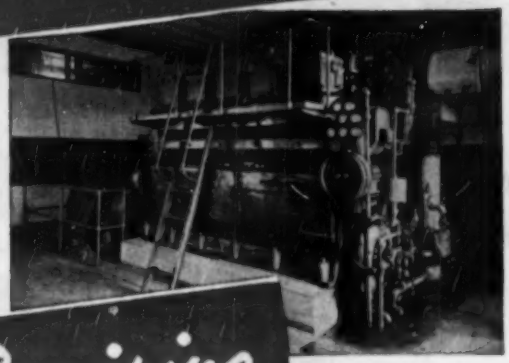
Both general offices and manufacturing operations of Purolator Products, Inc., are now located in the new plant at 970 New Brunswick Avenue, Rahway, N. J., the company announced recently. The company, formerly located in Newark, announced acquisition of the larger plant in Rahway, and plans for consolidation of its operations there, some time ago. Purolator makes automotive oil filters and other types of filtration equipment.





Every One New...





Every One Requiring

ADVANCED LUBRICANTS

DIESEL UNITS like these new "big babies" are a vitally important investment to any plant. They deserve and demand only the finest lubrication. Start them off with the right type and grade of oil and they will operate efficiently with little maintenance expense.

Take full advantage of the knowledge and experience of the Cities Service Lubrication specialists. These men are fully informed on the lubrication requirements of all the latest models. Their advice and recommendations can contribute to longer years of use, dependable and economical performance.

Write Cities Service Oil Company, Room 631, Sixty Wall Tower, New York 5, New York.

HELPFUL NEW BOOKLET—FREE!

We have a new 64 page manual entitled "Diesel Engine Lubrication." Write for your free copy of this fact-filled lubrication guide today.

CITIES SERVICE

Increasing Use for Light, High Speed Diesels

L. W. Beck

The spreading use of lightweight, high speed diesel engines in the United States has been spelled out for the world via Voice of America International Broadcasting by L. W. Beck, vice president of sales, Cummins Engine Company, Inc. Mr. Beck, in a broadcast recorded at the invitation of the State Department, said the engine developed by Dr. Rudolf Diesel in 1892 and its subsequent early designs were "too large, heavy, and slow" for truck usages. He went on: "Problems of adaptation center around design and around increasing power while decreasing weight. In 1937, for example, Cummins introduced a commercial automotive diesel with a supercharger. This stepped up power one-third with only a slight weight increase." Or, in other words, the weight-horsepower ratio shrank markedly.

Mr. Beck concluded, the "place of the diesel in America is growing steadily. At the start of 1950, for example, about one-fifth of all railroad locomotives in the United States were diesels, while only nine years earlier, the proportion was one-fortieth. In trucks for heavy-duty hauling jobs diesels also are favored. In fact, in every operation requiring mobile equipment with sturdy engines, Cummins believes diesels have not yet reached their full potential."

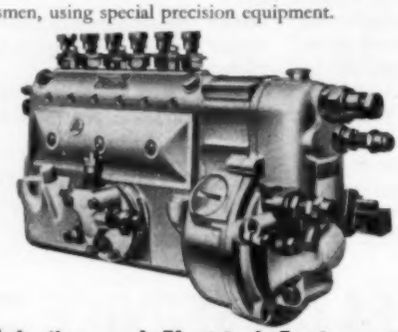
C.A.V. LIMITED SERVICE

Confidence Abroad

Transport operators all over the world have learnt to trust this sign.

In any language the letters on the C.A.V. sign stand for first-rate service facilities, maintained by highly-trained craftsmen, using special precision equipment.

Wherever vehicles fitted with C.A.V. Fuel Injection Equipment are exported — whether to Trondheim, Santiago, Hong-Kong or Sydney — there's a service agent or depot to give it the specialist attention needed for such high-precision equipment.



C.A.V. Fuel Injection and Electrical Equipment

Service Depots throughout the World

C.A.V. DIVISION OF LUCAS ELECTRICAL SERVICES INC., NEW YORK 19, N. Y.

Sales Office:
14820 DETROIT AVENUE, CLEVELAND 7, OHIO

President of Kurz and Root Company

Eugene B. Brownell

Eugene B. Brownell, for the past four years assistant to the president of Monroe Auto Equipment Co., Monroe, Michigan, is now president and general manager of Kurz and Root Company, Appleton, Wisconsin, manufacturers of AC, DC electric generators, motor generator sets, DC motors and special electric apparatus, through the purchase of controlling interest in the company. Henry Kuhn, former president, is still substantially interested in Kurz and Root Company, and becomes chairman of the board. He will supervise the company's engineering and technical departments. Mr. Brownell is a graduate of the University of Washington, Seattle, and Harvard Business School. He served in the United States Army as an instructor, Command and General Staff School—and as a member of the logistics planning staff in the Far East, leaving the army as a Colonel in 1946.

New Worthington Engine Bulletin

Worthington Pump and Machinery announced the availability of a new bulletin which permits the quick determination of lowest power costs by visual inspection. The information is imparted by a family of curves covering gas cost per 1,000 cu. ft. for dual fuel diesel and gas diesel, as well as spark ignition gas; and oil cost per gallon for oil diesel. The costs are given in dollars per thousand kilowatt hours. Copy of the bulletin may be obtained in wrtiing to Engine Sales Division, Worthington Pump and Machinery Corporation, P. O. Box 953, Buffalo 5, N. Y., asking for Bulletin S-500-B-1-50.

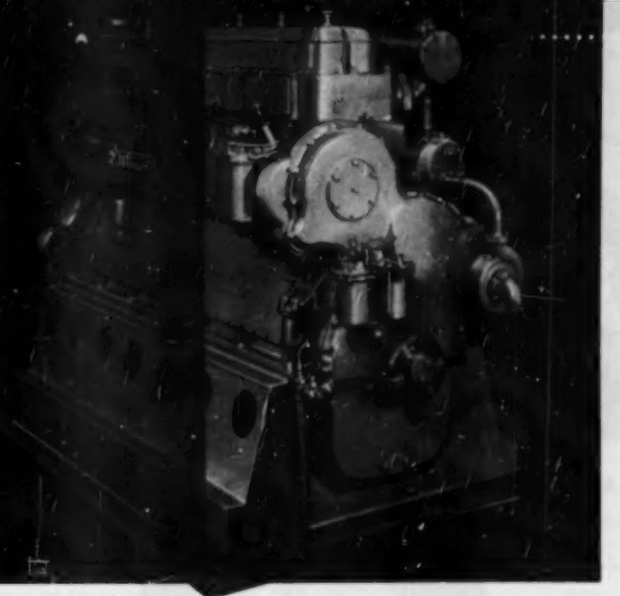
New Transformer Bulletins

Design and construction features of Allis-Chalmers' power and distribution transformers—both large and small and secondary network—are described in a new 16-page bulletin released by the company. Also covered are the three types of load-ratio-control mechanisms available on Allis-Chalmers power transformers, depending on the voltage, kva capacity and other circuit conditions. The bulletin also discusses step regulators, pole-type regulators, unit substations of all types, and instrument transformers. Copies of the bulletin, "Allis-Chalmers Power and Distribution Transformers," 01B6186B, are available upon request from Allis-Chalmers Manufacturing Co.

Diesel Engine Catalog now available in its Fourteenth Edition. See the unique Diesel Horsepower Range Chart—invaluable aid to design engineers and buyers.

engineered to bring you the finest in medium speed

packaged diesel power



...the New ENTERPRISE M SERIES Stationary Diesels

If you want 68 to 240 BHP, you'll get more for your money with an Enterprise 3, 4, or 6 cylinder M Series Diesel

- 8" bore x 10" stroke
- Compact, light weight
- Easy starting, air or electric
- Operate on wide variety of low cost fuels
- Extremely low fuel consumption
- Smooth, quiet, clean operation
- Front and rear end power take-offs

Write for new Enterprise M Series Bulletin No. M-16, or call your nearest Enterprise office for complete information.

Everything you want in efficient stationary power is wrapped up in the all-new M Series packaged power plants. Designed and developed to meet the demand for tough and continuous operation at medium speeds, these completely self-contained diesels in 3, 4 and 6 cylinder models are now available for the most economical solution to your industrial power needs. Small, compact, light weight, portable if desired, these units deliver 68 to 240 BHP at conservative speeds of 450 to 750 RPM. They are WORK engines, capable of thousands of hours in demanding service, at low cost, with minimum maintenance and servicing requirements. When you compare, feature for feature, you're sure to make your next diesel a medium speed, high capacity Enterprise M engine—for years of the smoothest power you've ever enjoyed.

Enterprise STATIONARY Diesels

ENTERPRISE ENGINE & FOUNDRY COMPANY

18th & Florida Streets, San Francisco 10, California Offices in Principal Cities

Cooper-Bessemer Engages Consultant

Robert P. Ramsey

As a step in an expanded program of market analysis, product development and diversification, The Cooper-Bessemer Corporation has just engaged the full-time services of consultant Robert P. Ramsey, recognized authority on industrial market research and product design. Mr. Ramsey recently became an independent consultant following 10 years of work with the Lima-Hamilton Corporation, H.O.R. Division, where, as vice president of engineering and chairman of the Lima-Hamilton engineering committee, he was responsible for the development of a wide line of industrial equipment such as canning machinery, body presses, locomotives, power shovels, heavy machine tools and internal combustion engines.

The very nature of the work now planned for this program will of course be highly technical and in most cases will require the close collaboration of Cooper-Bessemer engineers. For this reason, Mr. Ramsey will be under the immediate direction of Ralph L. Boyer, vice president and chief engineer, who has been a close friend of Mr. Ramsey for many years and was mainly instrumental in securing his full-time services. According to Messrs. Williams and Boyer, Cooper-Bessemer has no intention of limiting Mr. Ramsey's efforts to the power generating field. In fact, they explain that bringing in an outside consultant offers a fresh approach to Cooper-Bessemer's research and development program.

13 is your lucky number
ONLY WHEN YOU PROTECT YOUR ENGINE WITH
WINSLOW FILTERS

1 REMOVE ACIDS by special neutralizing agents.

2 STOP MOISTURE at water-repellent surface, absorb residue in element fibers.

3 TRIPLE SAFETY Patented rupture-proof double covering; element materials harmless to engine; additives unchanged in compounded oils.

4 TRAP ABRASIVES such as gritty carbon, dust, or metal particles.

5 TOP EFFICIENCY Channels narrow toward center, stop larger particles first, smaller ones later, hold them all.

6 FREE FLOW Entire outside surface filters oil; spring coil core maintains free flow.

7 LONGER LIFE Element fibers absorb impurities, straighten out, keep channels open for longer use.

8 ELEMENTS HOLD DIRT twice, triple, quadruple their original weight.

9 RIGHT SIZE Winslow Filters for all sizes of engines.

10 FULL-FLOW Filters all the oil oftener, cleaner.

11 ELEMENTS FOR ALL standard makes of filters.

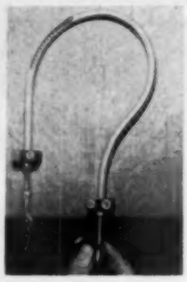
12 ENGINEERING SERVICE to meet special filtration problems.

13 DISTRIBUTORS AND DEALERS throughout the United States, Canada, in foreign nations, offer convenient service.

DETAILS? Gladly. Just write to:

WINSLOW FILTERS
Winslow Engineering Company
4069 Hollis Street • Oakland 8, California

Products for the Industry



The Southwest Products Company of California is offering the industry a complete line of flexible push pull controls (compression and tension type) and misalignment bearings and rod ends. The flexible controls are positive remote manual control and used for actuating mechanical, hydraulic or electric devices—within .010 of an inch in any selected position. Three types available, light duty, heavy duty and extra heavy duty, with load range to 3,050 pounds ultimate compression and 3,900 pounds ultimate tension. Minimum band radius of ¾-inch. Southwest controls remain in selected position and are not materially affected by changes in routing due to structure movement. Standard "O" rings seal both ends.

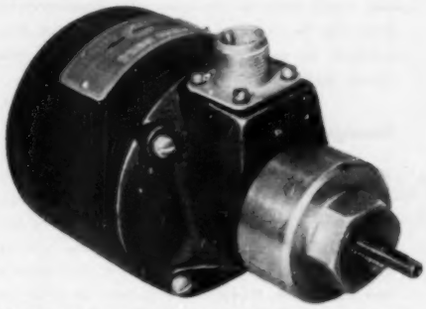
The misalignment bearings and rod ends come in bore sizes from 3/16-inch to 3-inch, accommodating ultimate loads from 7,000 pounds to 500,000 pounds. The ball is hard chrome plated. They can be used where lubrication by oil or grease is not possible and withstand high temperatures. Race materials in high-strength bronze, steel or stainless steel. For complete information write DIESEL PROGRESS, File 27, P. O. Box 8458, Los Angeles 46, California.

Vice President of Nordberg

James A. Friend

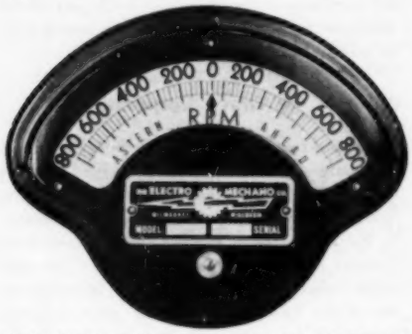
Mr. James A. Friend has been appointed Senior Vice President of Nordberg Manufacturing Company, Milwaukee, Wisconsin, according to an announcement by Robert E. Friend, president. Mr. James Friend, former vice president and general purchasing agent, will take over the duties of F. Howard Kilberry, who resigned to become a management consultant in charge of the Superior Engine Division of the National Supply Company at Springfield, Ohio. Mr. Floyd T. Finley has been appointed general purchasing agent of the Milwaukee Division of Nordberg to succeed James Friend. It is also announced that D. A. Cheyette, vice president of the crusher division, has been elected to Nordberg's board of directors. Mr. Arthur W. Mueller was appointed assistant controller of the company.

New Tachometer Generators and Indicators



Model 105A Electro-Mechano tachometer generator with S.A.E. coupling.

Recently announced is a new line of combination Electro-Mechano generators and tachometers. The generator, offered with SAE coupling, SAE flange mount and regular base mount, is an inexpensive precision tachometer unit. The housing is aluminum alloy and an extra shaft seal is provided to prevent entry of dirt and moisture. Precision ball bearings used are sealed and lubricated for life. The model 105 generator provides full scale indicator reading showing forward and reverse with any top speed from 300 to 5,000 rpm. Lower speed indication is available.

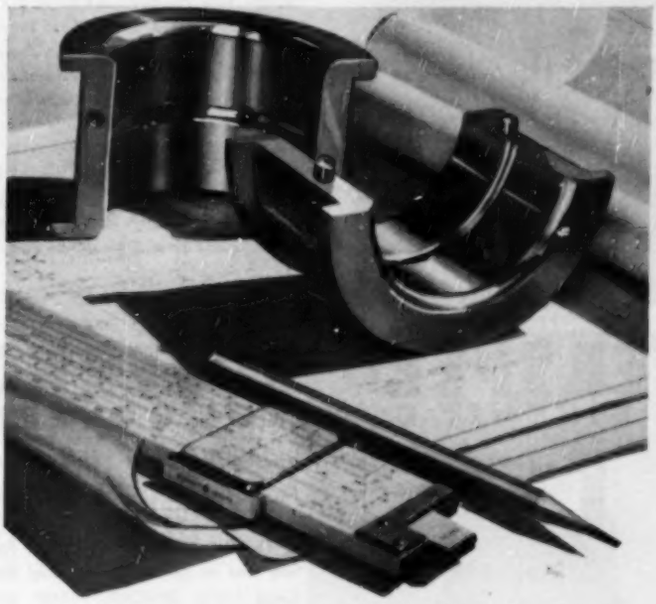


Model 169 Electro-Mechano tachometer indicating instrument, marine type.

The indicating instruments are offered in many styles and sizes and are calibrated to specification. They are accurate to within ½ per cent, 1 per cent or 2 per cent of full scale deflection. The instruments are completely enclosed, they are dirt and moisture proof and are protected against external magnetic fields. Further information may be secured by writing DIESEL PROGRESS, File 30, P. O. Box 8358, Los Angeles 46, Calif.

Appointment at Mack

Announcement is made by H. Bernard, chief engineer of the Mack Truck Company, of the appointment of G. E. Mintz as assistant to chief engineer with particular responsibility for the company's bus engineering. A Lehigh graduate and a registered professional engineer, Mr. Mintz joined Mack in 1933. Following a year and a half of assembly line work on both trucks and buses, he was appointed shop engineer in charge of bus construction, a position he held until 1943. Made engineer in charge of the company's bus division at that time, he served in that capacity until his recent appointment. Mr. Mintz will continue to make his headquarters at Mack's Allentown (Pa.) factory.

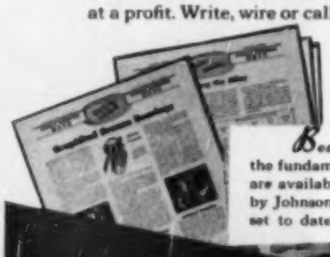


JOHNSON BRONZE

Welcomes

DIESEL BEARING PROBLEMS

Before designing sleeve bearings for diesels, Johnson Bronze engineers desire considerable information. They study load, shock, speed, temperature, corrosive conditions and other service considerations. As satisfactory performance of the engine is dependent on bearings that meet these operating conditions, complete data is imperative. Based on these studies, Johnson Bronze may recommend any one of several types of sleeve bearings and will design it to diesel requirements. This is the type of bearing service you can use at a profit. Write, wire or call today for an appointment.



for the ***ENGINEER***

Bearing data sheets which cover the fundamentals of Sleeve Type Bearings are available at no cost. They are written by Johnson Engineers. Write for complete set to date.

Johnson Bronze

SLEEVE BEARING HEADQUARTERS

445 SOUTH MILL STREET • NEW CASTLE, PA.

Call **JOHNSON BRONZE** *at* ATLANTA • BALTIMORE • BUFFALO • CAMBRIDGE CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DENVER • DETROIT • KANSAS CITY LOS ANGELES • MINNEAPOLIS • NEW YORK • NEWARK • PHILADELPHIA • PITTSBURGH ST. LOUIS • SAN FRANCISCO • SEATTLE

First Diesel-Electric Locomotives Built in Canada

Two streamlined diesel-electric locomotives, the first ever built in Canada, rolled off the assembly line at Montreal Locomotive Works recently. S. F. Dingle, Vice President in Charge of C.N.R. Operations, and Alistair Fraser, Vice President, Traffic, accepted delivery. Mr. Dingle congratulated Canadian workers on their craftsmanship, and said that the powerful new diesels were the start of an order for eight 1,500-hp. units. After a few runs between Montreal and Toronto, they will go into regular freight service in the rugged Lake St. John district of northern Quebec, hauling bauxite ore and paper over lines serving Joliette, Shawinigan Falls, Grand Mere, and Arvida.

In three years, production of diesel-electrics at Montreal Locomotive has mounted steadily, said Sir Frederick. Last year, 70 per cent of output went into steam and 30 per cent into diesel-electrics. This year he expected the ratio to be more than reversed, 90 per cent of production going into diesels, and only 10 per cent to steam.

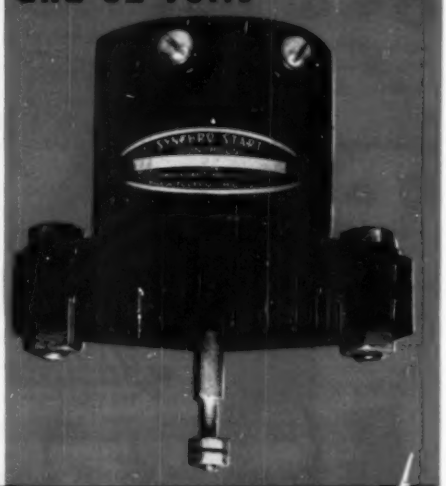
OVERSPEED GOVERNORS
and CIRCUIT CONTROL GOVERNORS
(Adjustable While Running)

PROTECT your engine and equipment from damage caused by overspeeding.

This INSURANCE costs so little for its protection that no power plant should be without it. Since 1932, SYNCHRO-START GOVERNORS and CONTROLS have been in use all over the world protecting and controlling power plants and many other types of machinery where circuits are to be made or broken at pre-determined speeds.

Write for bulletin No. 409 describing these proven controls. You can depend upon their rugged construction, design, and our many years' experience in this field. If you are a buyer of engines, specify SYNCHRO-START to your engine manufacturer. He will be glad to supply you with the controls best suited to meet your demand.

DC SOLENOIDS
6V—12V—24V and 32 Volts
(Continuous Duty)



This LITTLE GIANT is doing all sorts of jobs on engines and many kinds of machines. It has a ten pound pull and a half inch stroke.

It has many uses and can be used any place where an operation is desired. It is used for operating throttles, fuel pump racks, chokes, anti-Dieseling devices, valves, switches, and many other uses where automatic or remote control is desired.

Write for bulletin No. 410 describing this rugged control or for our latest catalog covering our complete line of SYNCHRO-START Automatic Controls which have been in use for the past seventeen years. You can't go wrong with SYNCHRO-START.

SYNCHRO-START PRODUCTS, INC.
Automatic Engine Control Equipment
1004 W. FULLERTON AVENUE, CHICAGO 14, ILL. U.S.A.

George W. Pressell

The death of George W. Pressell, 62, vice president of E. F. Houghton & Co., industrial oils, leathers and metal and textile processing products, Philadelphia, occurred suddenly on June 5 at his summer home in Ocean City, N. J. Mr. Pressell was the oldest Houghton employee in point of service, having started as a messenger boy 47 years ago at $2 a week. He had held offices of chief chemist, secretary, second vice president, general sales manager and director of sales. Since 1919 he had been a member of the board of directors. He was also president of E. F. Houghton & Co. of Canada, Limited.

During the first World War he contributed much to the heat treatment of steel for munitions. He developed the first treated quenching oil, and held a patent on a sulphurized cutting base, the first concentrate perfected for dilution in the user's plant. He was one of the founders and first chairmen of the Philadelphia Chapter of the American Society for Metals. He is survived by his widow and two married daughters.

Business for Dravo Corporation

The twin-screw diesel towboat, *Jefferson*, of American Barge Line Company's river fleet, recently was equipped with a pilot house engine control system at Dravo Corporation's Marine Railways in Pittsburgh. Built in 1942, the 170-foot vessel operates mainly in Ohio River trade. The pilot house control system, developed by Westinghouse Air Brake Company, gives the pilot finger-tip control of the main engines and eliminates the need for engine room signals. This improves the towboat's maneuverability since speeds can be changed instantly with the control arrangement. Also docked at Dravo's Marine Ways recently for regular maintenance and repair were the towboats *Reliance* and *Neville*, of Union Barge Line Corporation's fleet, and the *Wm. Pitt*, of the Keystone Division fleet.

New Recording Thermometer Bulletin

The Bristol Company has just published a 44-page bulletin giving complete information on its "Series 500" line of thermometers. Liquid-filled, vapor pressure, and gas-filled types are described in models for recording, indicating, controlling, and telemetering of temperatures. Each of the types of thermometers is fully described, with information given on operating principles, characteristics of operation, temperature sensitive bulbs, recording charts, and accessories. Resistance type thermometers, humidity instruments, and time-temperature controllers are also described. In addition to numerous photographs, the bulletin is liberally illustrated with reproductions of actual temperature chart records and sketches of applications to enhance its value as a handbook of industrial thermometry.

FULTON IRON WORKS CO.

FOUNDED 1852 INCORPORATED

ST. LOUIS (14), MO., U.S.A.

A STATEMENT TO OUR CUSTOMERS AND FRIENDS

Recently the management found it expeditious to get rid of certain machine tools in our shops which were considered surplus. As was expected, this led to certain rumors to the effect that the company was discontinuing all manufacturing operations. To paraphrase Mark Twain, the rumors were highly exaggerated.

Actually, the company will continue operations here, as in the past, fabricating in its own shops, and with its own personnel, orders received covering complete Diesel and Dual Fuel engines or spare parts thereof.

The same exacting supervision and control by our experienced technicians continues without interruption.

Our unexcelled Engineering and Service Departments will continue to cooperate with our clientele to solve any problems that might come up and recommend remedies for situations that require such attention.

The customary FULTON guarantee of quality, labor and materials will apply in the future as it has through the past 98 years of successful operation.

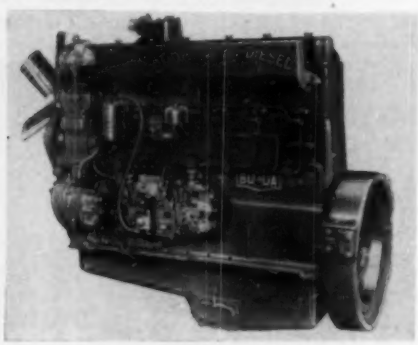
Needless to say, Fulton would be grateful to receive any of your inquiries for complete Diesel and Dual Fuel engines or spare parts thereof.

FULTON IRON WORKS COMPANY

F. E. O'Neil

F. E. O'Neil
President

New Engines Developed by Buda

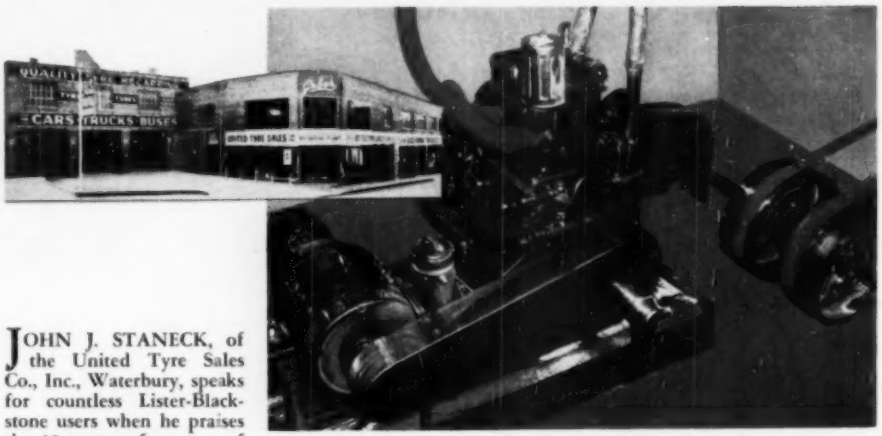


The Buda Company, Harvey, Illinois, announces the development of three new 161 Series, heavy-duty diesel truck engines – models 6DAS-844 215-hp. diesel; and 6DA-779, 185-hp. diesel. All are 6-cylinder diesels with practically the same mounting dimensions and are built on the same 161 Series production line. The displacement of these Dyna-Diesel engines is 844 and 779 cubic inches respectively. All three engines have the same bore of 5¼ inches. The stroke of the 844 engines is 6½ inches; the stroke of the 779 engine is 6 inches.

The features of these truck diesels are more power with less weight, lower fuel consumption, more mileage between overhauls, less maintenance on the road, no smoke and smoother operation. These DA engines have a new special mono-lobe Dyna-Swirl combustion chamber which enables these engines to develop increased horsepower. The Buda controlled turbulence, low pressure combustion system insures thorough utilization of the fuel so that there is no wasted fuel in the form of heavy black smoke. The low, more uniform pressure in the cylinder makes for smoother performance with less wear of moving parts. Crankshafts are completely counter-balanced and engines are provided with torsional vibration dampeners to insure smoother engine operation. A large number of the engine parts such as intake manifolds, compressor brackets, oil cooler housing, gear housing and covers, etc., are made of aluminum to reduce the total weight of the engine.

"TREMENDOUS *Power*..."

"...paid for itself many times!" Says Connecticut's Largest Recapper of Tires



JOHN J. STANECK, of the United Tyre Sales Co., Inc., Waterbury, speaks for countless Lister-Blackstone users when he praises the 11-year performance of his Company's Lister-Blackstone Model 18-2, two-cylinder 20 h.p. diesel.

"For our electric power," he says, "and our buffing process in recapping, its power is tremendous. It has paid for itself many times; our expenses are far less than ordinary."

The engine, in daily use since 1939, has never had a breakdown.

If you are interested in slashing your power costs by using rugged and dependable diesel horsepower, then you'll be interested in using Lister-Blackstones.

Reduced Prices!

However you figure it—low price, operating economy, long life — you'll get utmost value for your dollar in a Lister-Blackstone diesel. 3 to 480 h.p. Write us your requirements. Address Dept. DP.

Lister-Blackstone

LISTER-BLACKSTONE, Inc.

Factory, Sales & Service Headquarters: 420 Lexington Avenue, New York 17, N. Y.
Parts Warehouses: NORFOLK, Va. 109 Second Street; BOSTON, Mass., Whesco Bldg., Fish Pier
Agents in: Boston • New York • Norfolk • New Orleans • Mobile • Tampa • Miami • Jacksonville • San Antonio • Dallas • Houston Newton (Iowa) • Seattle • Los Angeles • San Francisco • San Diego • Montreal • Toronto • Winnipeg • Vancouver
Sold and Serviced in 37 Countries Throughout the World

Tremendous Interest Shown

In our May issue on page 80 we illustrated and described a new Trouble Spotter designed by Professor P. H. Schweitzer, of State College, Pa. This news item aroused a lot of interest, more than any single item we have run in many a long month. So we are running the same illustration as we did in May and suggest you write Edward M. Power Co., Granite Building, Pittsburgh, Pa., who are sole distributors, for full details. This trouble spotter is simple in its operation. In effect, three slide rules, one on firing pressures, one on compression pressures, and the other on exhaust temperatures. Because of the interrelation of these three indices, the slide rule portion of this trouble spotter must be set opposite one of five pointers indicated in the illustration above to produce the code number which is, in turn, interpreted in the exhaustive and splendidly informative booklet which comes with the Trouble Spotter. The price is $3.00, and its worth many times that price in daily use and operation in connection with your diesel engines.

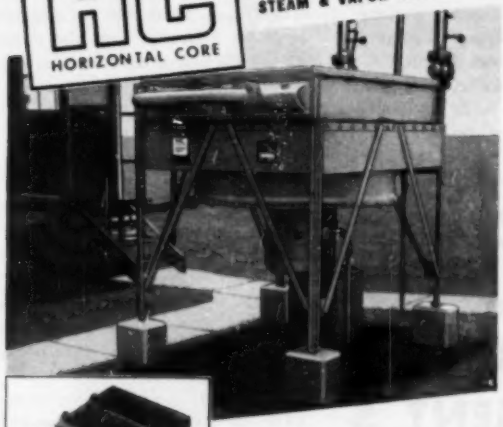
Manual for Cleaning Railroad Diesels

The Magnus Chemical Company of New Jersey has available a manual entitled "Railroad Cleaning–Section 1 Diesels." This manual describes the cleaning problems of the railroad industry and how these same problems are solved by the materials and methods recommended by Magnus. A great amount of research was undertaken for the presentation and information incorporated in this manual and it covers such subjects as: Diesel Parts Cleaning; Where Cleaning Is Done; Magnus Cleaning Methods; Diesel Shop Case Study; Diesel Electrical Shops; Cleaning Air Filters; Filter Cleaning Methods; and many more interesting and informative subjects.

YOUNG "HC" HORIZONTAL CORE

ECONOMY PLUS VERSATILITY IN

WATER, OIL, GAS COOLING... STEAM & VAPOR CONDENSING



Basic "HC" Unit may be used in multiples for greater cooling capacity or combination of services.

IMPORTANT FACTS ABOUT THE "HC"

- LOW COST—small initial investment, economical maintenance.
- VERTICAL AIR DISCHARGE—eliminates cross wind effects.
- HIGHLY EFFICIENT—airfoil section fan.
- MULTIPLE INSTALLATIONS—provide greater capacity, combined services.
- NO VIBRATION—adjustable pitch fan mounted separately from unit.
- LARGE CAPACITY—water cooling, from 600,000 Btu/hr up; oil cooling, from 20,000 Btu/hr up.
- LOW HP REQUIREMENT—1 to 10 hp per fan.
- EASY INSTALLATION—simplified piping and frame construction.
- CORE GUARD SCREEN—protects cores from falling objects.

• Here is another development by Young providing high efficiency cooling and condensing at low initial and operating costs. The Dual coil "HC" is designed for water and lube oil cooling. Manifolds are available for all types of coils. Four sizes, with 2, 4, 6 and 8 coil installations, provide exceptional versatility in heat transfer service. The 4 or 6 blade fan, serving each two coil unit, may be mounted directly on the fan motor shaft, or powered by a V-belt or gear speed reducer drive. Full details about the new "HC" Units, or other Young Heat Transfer Products, are available on request.

YOUNG

HEAT TRANSFER PRODUCTS FOR AUTOMOTIVE AND INDUSTRIAL APPLICATIONS.

HEATING, COOLING, AND AIR CONDITIONING PRODUCTS FOR HOME AND INDUSTRY.

T.M. REG. U.S. PAT. OFF.

YOUNG RADIATOR COMPANY

DEPT. 400-G, RACINE, WISCONSIN

Plants at Racine, Wisconsin and Mattoon, Illinois

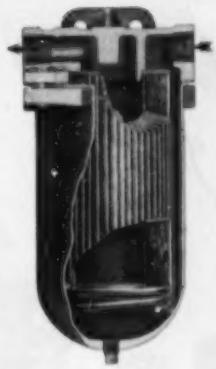
DISTRIBUTORS • J. R. Mock Company, 1341 S. Boston St., Rm. 109, Tulsa, Okla. • Flournoy & Everett, Inc., 5043 Santa Fe Ave., Los Angeles 58, Calif. H. J. Young, 1364 Lake Shore Dr., Muskegon, Mich. • Others in Principal Cities

Bendix-Skinner

ORIGINATOR OF **MICRONIC** FILTRATION

Results Prove It the *Finest* Name in Filtering

Nine times out of ten ***Bendix-Skinner*** Filters will supply the "finest" answer to your filtration problems. Here are the facts: available with patented, exclusive, resin impregnated cellulose elements; simple, quick replacement; high flow rate with minimum pressure loss; no channeling or bypassing; over 350 models providing filtration from ½ micron (.000019") upwards at flow rates from 1 to 5000 g.p.m. Why not let ***Bendix-Skinner*** filtration engineers work with you? Write us direct.



Model 3110-P filter element, 6⅛" x 3⅛", has a filtering area of 940 sq. in.!

SKINNER PURIFIERS DIVISION OF
1503 TROMBLY AVENUE
DETROIT 11, MICHIGAN

Bendix AVIATION CORPORATION

Export Sales: Bendix International Division, 72 Fifth Ave., N. Y. 11, N. Y.

N. Y. State Building Four Canal Tugs

A shipbuilding contract covering the construction of four small tugboats has been awarded to the American Boiler Works at Erie, Pennsylvania, by the State of New York's Division of Standards and Purchases on behalf of that State's Department of Public Works. These steel tugs have been designed by the Yourkevitch Ship Designs Co. for service on the New York State Barge Canal System. Each will be propelled by a Model 6EM253RG Atlas-Imperial four cycle 6-cylinder 6¼x8¼-inch diesel engine with built-in reverse and reduction gear unit in ratio of 2:1. Each engine is rated to develop 135 hp. at 900 rpm. and will swing a 42-inch three-bladed bronze propeller at 450 rpm. on a 3½-inch diameter steel tail shaft with bronze sleeves and brass stern tube. These engines employ the American Bosch fuel injection equipment with individual fuel injection pumps. Fuel oil will be carried in P/S wing tanks totalling 1,160 gals., fresh water in peak tank 750 gals.

The engines will be equipped with a heat exchanger fresh water cooling system and they will be air starting, having an inbuilt air compressor and an auxiliary gasoline engine driven unit for the purpose designed for a maximum working pressure of 250 psi. to provide storage of air in a 20x60-inch air receiver. A 750-watt 32-volt Electric Specialty Co. D. C. Generator will be V-belt driven from a sheave mounted inside the power take-off clutch at the front end of the engine and from this power take-off there will be driven by V belts a 2½-inch intake and 2-inch discharge Marine Products Co. all bronze centrifugal bilge and general service pump. An Exide Marine Storage Battery will have ample capacity to provide for the lighting load onboard the tug, including the searchlight. A mechanical system of pilot house controls will be installed for the reverse gear, governor and starting air valve on the engine. A Maxim spark arresting type exhaust silencer will be mounted in the stack aft of the deck house. There will be accommodation onboard for a crew of four, also messing faciilties. The completion of the four small tugs now under construction is expected this summer.

New Bulletin for Nordberg Dual Fuel Engine

Publication of a new bulletin describing and illustrating the Nordberg 4-cycle, 16-inch, Duafuel diesel engine is announced by Nordberg Manufacturing Company. This engine, Type FSG-16, is built in supercharged or non-supercharged units from five to eight cylinders with a 16-inch bore and 22-inch stroke. The horsepower range at an operating speed of 327 rpm. is from 730 hp. for the 5-cylinder non-supercharged engine to 1,750 hp. for the 8-cylinder supercharged unit. Ratings up to 2,100 hp. are available by intercooling and high pressure supercharging.

Bulletin 177 illustrates various power applications of this Duafuel engine that operates economically with the same high diesel efficiency on gas fuel with pilot oil, on oil fuel or on intermediate proportions of either fuel. The engine is also adaptable for operation on sewage or other low heat value gases. The bulletin shows by a schematic sketch and description the operation of this engine and the ease of immediate changeover in type of fuel. A feature of Nordberg Duafuel diesels is an automatic positive return to full oil operation in event of gas supply interruption. Bulletin 177 is available free upon request.

Lima-Hamilton Announces Diesel Order

Lima-Hamilton Corporation has announced receipt of orders for two large Hamilton diesel engines, both two-cycle units with 21½-inch bore and 27½-inch stroke with rotary valves. One is an 8-cylinder marine diesel for the Pittsburgh Steamship Company, Cleveland, Ohio, for installation in the ship, *Eugene W. Pargny*, with a rating of 3,570 brake hp., 252 rpm.,, geared down to 110. This unit, Lima-Hamilton said, will set the pace for Great Lakes shipping, and delivery will be made in time for installation when the ship is laid up for the winter.

The second Hamilton diesel is a 6-cylinder engine to drive a 2,000-kilowatt direct-current generator for use in the electrolytic refining of copper. This order is for the Perth Amboy, N. J., plant of the Raritan Copper Works of International Smelting and Refining Company, a subsidiary of Anaconda Copper Mining Company. Operated at 250 revolutions per minute, direct connected to generator, the diesel is designed so it can be converted to dual fuel operation by the addition of gas injector equipment. This unit is engineered for 24-hour day operation, 365 days a year.

The Best Protection

for your

DIESEL ENGINE

$ INVESTMENT $

is the most economical

The old saying "Don't send a boy to do a man's job" pertains to Oil Filters, too.

MICHIANA-engineered Oil Filters have protected Diesel engines for many years—against premature wear—against unnecessary overhauling.

On Diesel Locomotives their performance has been outstanding.

They cut lubricating oil costs, reduce oil changes and provide for long-life engine efficiency and economy... No one accessory is as important to engine performance and reliability as a good oil filter... Bulletin 45-D mailed on request.

ABOVE: *Pre-packed Michiana Filter Elements provide quick easy replacements.*

RIGHT: *Michiana 6-Element Filter installed on one of the latest model Diesel Locomotives.*

MICHIANA PRODUCTS CORPORATION

MICHIGAN CITY, INDIANA

Cummins® Custom-built Diesels

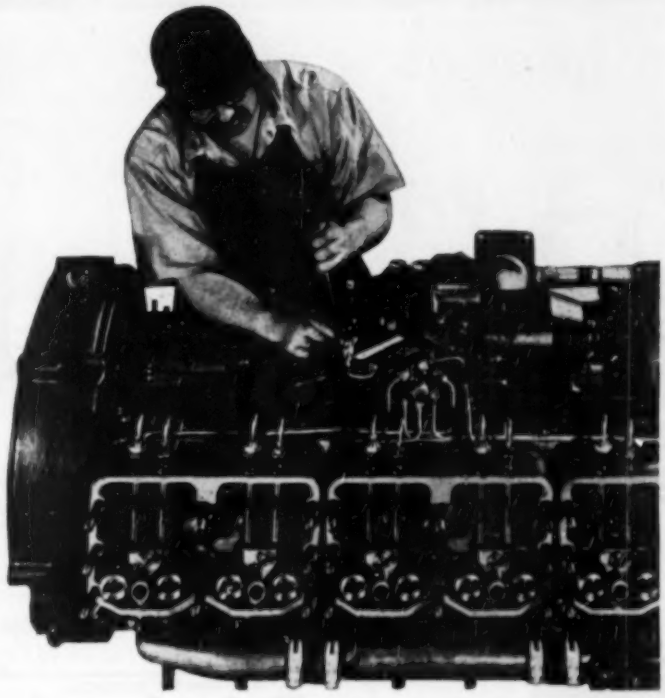
Built not once but Twice

The better-built engine for better power profits

Every lightweight high-speed Cummins Diesel is actually built *twice*. After initial assembly, each engine is run-in on the test block. Then it is torn down and carefully re-inspected—after that it is re-assembled and tested *again* to assure *peak performance*. And that is only *one* example of the extra care, the precision-workmanship . . . that goes into every Cummins custom-made engine.

That's why a Cummins Diesel is an investment that has *greater earning power* for you. The finest of engine-craftsmanship . . . exclusive Cummins fuel system . . . and custom-built engines "that fit your job" make a rugged, quality-engineered Cummins Diesel *the better buy for your power needs.*

Contact your Cummins dealer. He has more facts to show you about making more profits with



CUMMINS Diesel

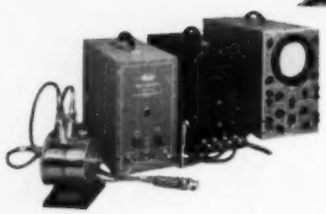
TRADEMARK REG. U. S. PAT. OFF.

Diesel power by CUMMINS

CUMMINS ENGINE COMPANY, INC. • COLUMBUS, IND.

EXPORT: CUMMINS DIESEL EXPORT CORPORATION
Columbus, Indiana, U. S. A. · Cable: Cumdiex

Lightweight High-speed Diesel Engines (50-550 hp) for: On-highway trucks · off-highway trucks · buses · tractors · earth-movers · shovels · cranes · industrial locomotives · air compressors logging yarders and loaders · drilling rigs · centrifugal pumps generator sets and power units · work boats and pleasure craft.

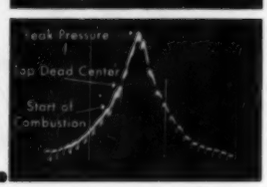


RESULTS OF DIESEL LOCOMOTIVE "FULL LOAD TEST"*

	COND. 1	COND. 2	COND. 3	COND. 4	COND. 5
Start of Fuel Injection	29° BTC	26° BTC	24° BTC	23° BTC	21° BTC
Maximum Horsepower	1048	1056	1073	1084	1026
Start of Combustion	12.5° BTC	7.5° BTC	4° BTC	3.5° BTC	3° BTC
Location of Peak Pressure	8° ATC	10° ATC	12° BTC	12° ATC	12° ATC
Maximum Firing Pressure	988PSI	933PSI	872PSI	860PSI	835PSI

*Data courtesy of COOKTITE RING SALES CO., Chicago.

This photo shows conditions at start of test. (Condition No. 1.)



This photo shows optimum injection and peak pressure timing for this engine. (See condition No. 4.)

"Pulse" Measurement with Pressuregraph Means More Power, Less Maintenance!

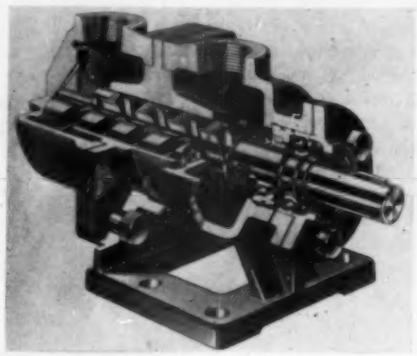
Get maximum power at minimum PSI from Diesel engines with the new Syncro-Marker Pressuregraph! It provides a detailed picture of the firing, of regular and instantaneous pressure variations. Accurately measures pressure rise with time, from vacuum to 14,000 PSI. Exclusive patented features! Proved in use by countless nationally known firms!

Today . . . write for booklet, "Electronic Methods for Measurements of Pressure and Displacements."

Electro ELECTRONIC EQUIPMENT
PRODUCTS LABORATORIES, INC.
4509 RAVENSWOOD AVE.
CHICAGO 40, ILLINOIS

Pioneer Manufacturers of Electronic Equipment

New Low Cost IMO Pump



The new De Laval-IMO Series A313A pump is designed for pumping petroleum products and other light or viscous fluids in volumes to 85 gpm. against pressures up to 150 psi., as required for rotary and steam atomizing oil burners, oil transfer, lubrication, hydraulic systems and similar service. Like all other IMO pumps, the A313A is extremely simple. There are only three working parts—a power rotor and a pair of sealing or idler rotors which mesh with the power rotor in such a manner that liquid is conveyed continuously from inlet to outlet. There's nothing to get out of order or require adjustment. This De Laval-IMO can be direct-connected to electric motors, turbines or other high speed drivers without reduction gearing, belts or chains.

Because of its compact design, the De Laval-IMO A313A requires little space, and the fact that it can be direct-connected to its driver also is a space-saving feature. All parts are interchangeable. The mechanical seal requires no attention. The pump can be mounted in any desired position. Suction can be located at top, bottom, horizontal left or horizontal right. For additional information, write to DIESEL PROGRESS, File 24, P. O. Box 8458, Los Angeles 46, California.

District Manager For Nordberg

Dice Cowger

The appointment of Dice Cowger as District Manager of the diesel engine department is announced by R. W. Bayerlein, Vice-President, Heavy Machinery Division, Nordberg Manufacturing Company, Milwaukee 7, Wis. Mr. Cowger has his headquarters at the Busch-Sulzer Bros. Diesel Engine Company Division of Nordberg in St. Louis. Prior to his joining Nordberg, Cowger was a member of the sales force of National Supply Company, which he joined in 1947. From 1942 to 1945 he represented Busch-Sulzer Company in the New York office. From 1945 to 1947 he marketed and jobbed gasoline in St. Louis. From 1937 until the time he joined Busch-Sulzer in 1942 he went into the gasoline jobbing business and took on marketing outlets of his own. Mr. Cowger has expert first hand knowledge of fuel oil refining and its relative advantages for use in diesel engines.

Pritchard's NEW Quintair*

AIR COOLED HEAT EXCHANGER

For Low Cost, Dependable Cooling of Engine Jacket Water and Lubricating Oil

- Lower Installed Cost
- Higher Efficiency
- Fewer Parts to Assemble
- Lower Maintenance Costs
- Lower Operating Costs
- Many Industrial Uses

Write for *FREE* Bulletin No. 11.0.080

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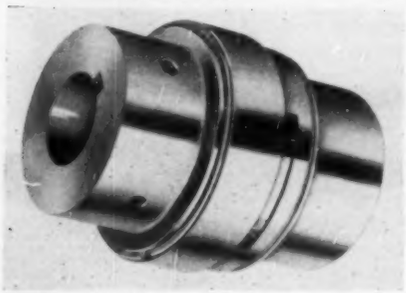
Appointed Vice President of ABOE

D. R. Johnson

Donald R. Johnson, newly elected vice president of Associated British Oil Enignes, Inc, has recently arrived in the United States to assume his new duties early in April. He began his activities by supervising the program for the company's convention of approximately 100 distributors and dealers from all parts of the country which was held at the Waldorf-Astoria. Mr. Johnson received his early technical training with the Ford Motor Company, which he left at the outbreak of the war to take a commission in R.E.M.E.

New Flexible Coupling



Extra ease of installation, larger bore capacities, are important features provided by the improved Lovejoy L-R Type "C" and "H" Couplings. These couplings are designed for use on motor-driven or engine-driven pumps, compressors, generators, pulverizers, and almost all machinery of 50 to 1,000 hp. Heavy models are of electric cast steel. In these new couplings, the inside sleeve is made in two parts, instead of one—providing a sleeve in each body. Both bodies are machined alike for the removable steel collar. This makes it easy to put the collar on either half of the coupling. The collar is held in place by a snap-ring.

As with all Lovejoy couplings, these new models instantly adjust for misalignment, shock, vibration, oscillation, surge or backlash. Also, half of the cushions are idlers (except on reversing load); hence there's always a set of new cushions in the coupling. This eliminates shut-downs, as load cushions can be quickly interchanged without tearing down coupling. Cushions are always in sight. There is no wear on the metal jaws, and couplings will last a lifemtime. No lubrication is required, and yet all couplings are extremely quiet in operation. Lovejoy builds couplings for every service and kind of service from 1/6-hp. to 2,500-hp. Further details may be had by writing DIESEL PROGRESS, File 18, P. O. Box 8458, Los Angeles 46.

Appointment at Hunt-Spiller

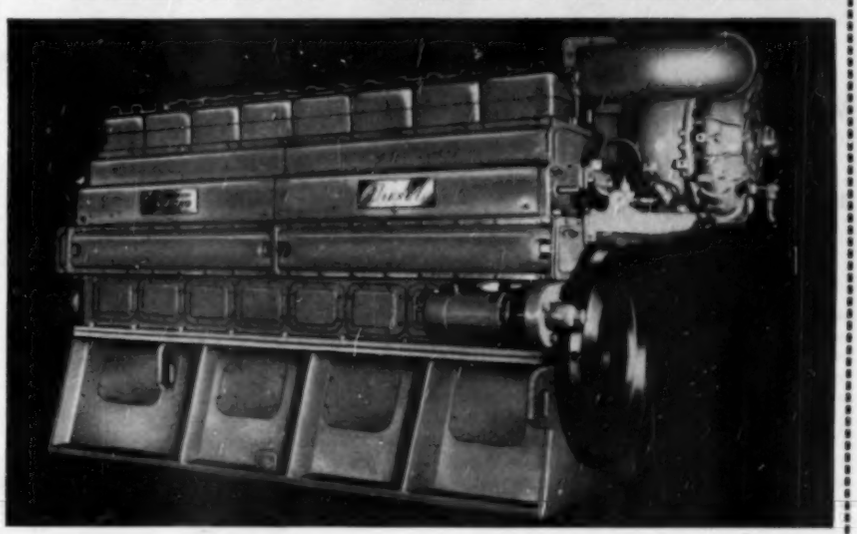
J. William Schaeffer has been named head of the standards section, production control department, of Hunt-Spiller Manufacturing Corp., Boston, producers of diesel engine castings. With the company since 1936, he has been in production standards work since 1947.

Appointed Assistant to President

H. C. Ramsey, president of Worthington Pump and Machinery Corporation, announced recently that Charles A. Butcher had joined the organization June 1st as assistant to the president. Mr. Butcher formerly was general manager of Crocker-Wheeler Electric Manufacturing Company, and vice president of its successive parent companies, Joshua Hendy Corporation and Elliott Company. He will make his headquarters at 2 Park Avenue New York, N. Y.

Mr. Butcher graduated as an electrical engineer from Iowa State College in 1915, and worked briefly for the Des Moines City Railway Company, Des Moines, Iowa. He joined Westinghouse Electric Corporation in 1917 as a salesman and served in various executive capacities in their engineering and manufacturing divisions until 1943, when he became Pacific Coast manager of district manufacturing and repair department. In 1945 he was named assistant general manager of Crocker-Wheeler Electric Manufacturing Company, becoming general manager in 1946.

More POWER... Less SPACE
WITH
STERLING VIKING DIESELS



This 8-cylinder turbo-supercharged Viking Diesel is conservatively rated at 750 hp. Sterling Diesels are available in five different models beginning at 100 hp.

DIESEL POWER
for all
INDUSTRY

AUTOMATIC POWER PLANTS
DRILLING RIGS — HOISTS
LOCOMOTIVES — PIPE LINES
GENERATOR SETS
FISHING CRAFT — DREDGES
LIFT BRIDGES — TOW BOATS
COMPRESSORS — AIRPORTS
VENTILATING SYSTEMS
PUMPING STATIONS
SHOVELS

Sterling Viking Diesel engines offer definite advantages in:

Compactness . . . more power in less space. A high ratio of horsepower to weight.

Sturdy construction . . . one piece block and base. All working parts are easily accessible.

Dependability . . . Service records show a high operating efficiency, low maintenance cost. All Sterling Diesels are conservatively rated, built to deliver smooth performance over their full power range.

Without cost or obligation, talk over your power requirements with an **experienced** Sterling engineer. We invite your call and the opportunity to bring you up to date on Sterling's accomplishments.

STERLING ENGINE COMPANY

1270 Niagara St. Telephone Lincoln 0382 Buffalo 13, N. Y.

Sterling Viking Diesel Engines from 100 to 750 hp.—Sterling Gasoline & Gas Engines from 100 to 600 hp.

Fram Constructs New Plant

Steven B. Wilson, chairman of the board, Fram Corporation, Providence, Rhode Island, has announced the beginning of construction on a new subsidiary plant at Greenville, Ohio, to be utilized both by Fram Corporation and its associate company, the Mason Can Company. Part of Fram's expansion program, the new plant will provide needed extra facilities for handling the corporation's increased volume. The Ohio site was selected because of its strategic location in relation to Fram's midwestern distributors, and the major car factory plants in Michigan and Ohio. This accessibility is expected to facilitate servicing of these vital automotive centers. Other branch factories of the Fram Corporation are located at Pawtucket, Rhode Island; Jacksonville, Florida; Otsego, Michigan; and Independence, Kansas.

New Panel Type Ventilation Filter

The latest addition to the line of Staynew Dry Panel Filters manufactured by the Dollinger Corporation is the model WKE-8 filter. This filter is 24x24 inches square by 8 inches deep, providing an active filtering area of 28 square feet, giving a maximum of filtering area in any given space. The media most generally used in the WKE-8 is Feltex Paper, either six or ten ply. Other media are available for special conditions. The complete unit consists of a die cut and stamped heavy steel cell and frame with heavy galvanized screen being used as a permanent form to support the filtering media. Lifting handles and cam type locking latches are supplied as standard equipment on this model. A mechanical loading machine is available for quick, easy loading of replacement media in this unit. For further information, write DIESEL PROGRESS, File 28, P. O. Box 8458, Los Angeles 46, California.

Gas Turbine-Electric Locomotive Starts Second Year of Test

The nation's first gas turbine-electric locomotive, a 4,500-horsepower unit which the General Electric Company and American Locomotive Company are testing on the Union Pacific Railroad, has returned to freight runs after undergoing a thorough shop inspection following completion of its first year of operation. In summarizing the unit's first year on the rails, G. W. Wilson, manager of G-E's Locomotive and Car Equipment Divisions, declared that during the period the locomotive "performed successfully under almost every conceivable operating condition." Wilson emphasized, however, that the developmental unit must undergo many more hours of rigid road tests before its future as a railroad prime mover can be determined.

Diesel Division for Lancaster Engineering

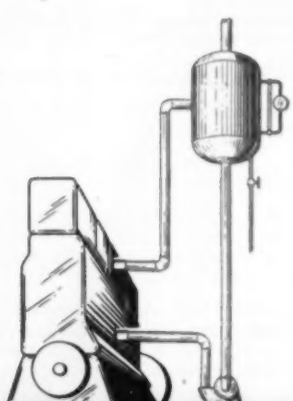
Establishment of an Automotive Diesel Division of Lancaster Engineering Corporation is announced by Irl A. Daffin, company president. The new LEC division will specialize in the installation of "on-highway" diesel truck engines. The concern has purchased a Brockway tractor and equipped it with a Buda diesel engine for use as a demonstrator. Company facilities at Lancaster, Hazleton and Philipsburg will participate in the automotive diesel program. John J. Burkholder will be in charge of the new division at Lancaster, with Fred Gardner of Hazleton in charge of the Hazleton branch. Ned Beezer, also of Hazleton, will be in charge of sales in the Philipsburg area. Service and installations will be handled by R. E. Griffith, service manager at Lancaster, and Guy Stauffer at Hazleton, while Ken Urban will be in charge of installations in the Philipsburg area.

VAPOR PHASE GIVES US AN "AIR CONDITIONING MIRACLE" and an Efficient Heating System, too!

Says J. H. Wally, Sr., President
WESTERN BLUE PRINT CO., KANSAS CITY, MO.

"Since adding Vapor Phase, in July, 1949, to the two natural gas powered engines in our plant, we now have an amazingly efficient system that (1) furnishes electric power for the blue print and photocopy machines and for general lighting, (2) air conditions the building in summer with steam, (3) heats it in winter with waste engine heat via the air conditioning system, (4) heats water for the blue print machines, and (5) furnishes items 2, 3, and 4 *for free!*

"All this for an engine fuel bill of only $480 a year and we SAVE better than $1,260 annual heat and refrigeration costs. This saving more than paid for Vapor Phase installed."



VAPOR PHASE also Serves Many Other Needs

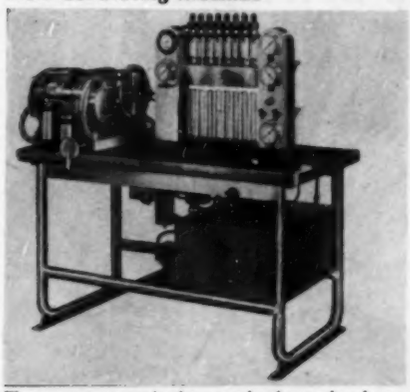
Wherever engines operate, regardless of business or requirements, Vapor Phase converts old or new engines into long life, super-efficient power units, without increasing the fuel bill. Vapor Phase equipped engines also serve the multi-purpose job of generating steam, heating water, fluids, space or other process—each as required or all at the same time, for the cost of engine operation only.

VAPOR PHASE pays off in Savings alone, the first year. The unit costs nothing to operate and is good for life.

Write or Wire for Information Applying to Your Specific Needs
Offices in Most Principal Cities

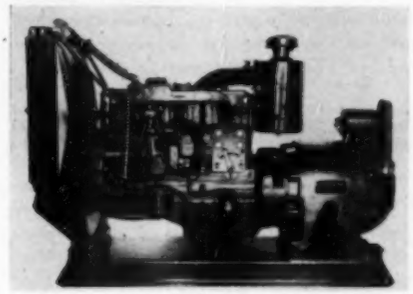
ENGINEERING CONTROLS, Inc.
2835 East Eleventh St., Los Angeles 23

New Calibrating Machine



Fleet owners, repair shops and others who do extensive repairs and adjustment on diesel fuel injection pumps are finding it profitable to have an AP 3200 calibrating stand among their equipment, according to the manufacturers. This new piece of testing equipment is a self-contained unit for calibrating, testing and adjusting fuel pumps. With adapters, nearly every pump made can be accommodated. Pumps and governors can be completely set to exact factory specifications. The manufacturers of this equipment have been designing and developing diesel testing equipment for over 17 years and now have stands in use throughout the United States and in many foreign countries. Further information may be obtained from DIESEL PROGRESS, File 26, P. O. Box 8458, Los Angeles 46, California.

New Line of Diesel-Electric Generator Units



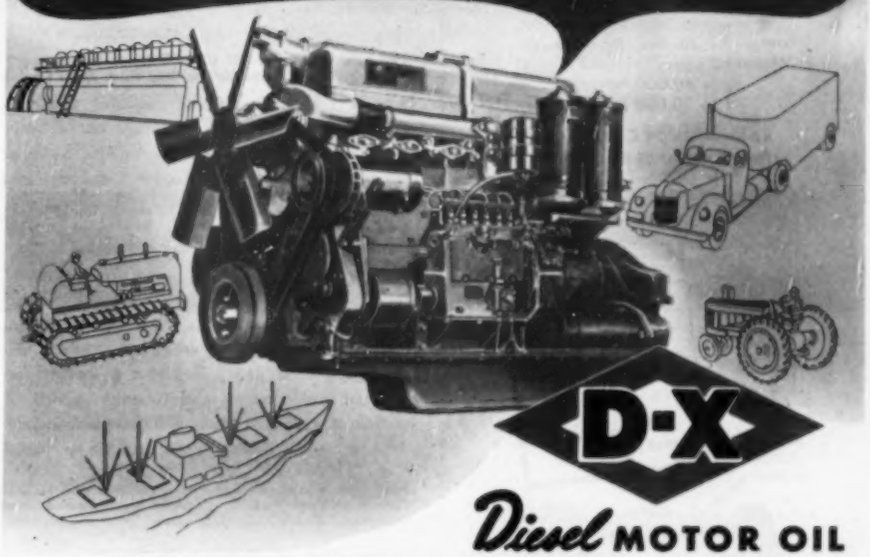
Production of a standard commercial line of diesel-powered electric generator units is announced by Cummins Engine Company, Inc., of Columbus, Ind. Sixty-cycle units are available in 40, 50, 60, 75, 100, 125, 200 and 250 kilowatt ratings. Similar units are also available for 50-cycle operation at a slight de-rating in kw capacity. Optional equipment offered by Cummins for the various generator units includes automatic overspeed shut-down control; automatic high temperature and low lubricating oil pressure shut-down; complete marine-type or radiator-type cooling systems; hydraulic governor; water-cooled exhaust manifold, and generator mounted package control unit. Special generator voltages and kw. ratings are also available.

The standard diesel generator units offered are of the alternating current type, 50-60 cycle, 3-phase, 3-wire, 3-phase 4-wire. The unit consists of the engine direct connected to a single bearing generator, the engine and generator being mounted on a common structural steel sub-base. All kilowatt ratings shown are for continuous duty operation. At full load of the generator, the engine delivers from 68 to 76 per cent of the maximum horsepower available at that speed, depending upon the kilowatt size of the generator and the engine used. For intermittent duty or standby applications, the engine rating can be increased to provide for the increased kilowatt output of a larger generator; however, such a unit is not standard and is subject to special engineering and approval by Cummins Engine Company, Inc.

Engine Indicator for High-Speed Diesels

The Bacharach Industrial Instrument Company has made available an engine indicator that is able to record a complete pressure-time diagram in a single engine cycle. The diagram is traced on paper and is large enough for detailed study. A large assortment of pressure springs gives the advantage of great flexibility in the application of this indicator. The complete indicator outfit is contained in a neat carrying case which measures only 8½x11¾x6¼ inches. This feature of convenient portability makes the engine indicator particularly well suited for installation and service engineers who want a compact, durable and completely self-contained indicator outfit for field tests. For further information, write DIESEL PROGRESS, File 29, P. O. Box 8458, Los Angeles 46, California.

Cuts "BREAK-DOWN" Losses



D-X

Diesel MOTOR OIL

Here's Proof that

D-X SAVES WEAR

After 6,500 hours of operating under severe conditions, using D-X Diesel Motor Oil, these Diesel parts were inspected for wear. Here are the results: No perceptible wear on the piston pin. Only .0025" wear on thrust side of the cylinder liner. Intake ports of the liner are still clear. Piston rings still serviceable. Only .005" wear on the crankshaft. You get results like this with D-X Diesel Motor Oil. Try it! See for yourself how D-X saves wear.

Ask the Diesel operator who uses D-X Diesel Motor Oil. He'll tell you that there are fewer breakdowns, fewer stops for lubrication reasons. That's because D-X is a lubricant that has unusually high resistance to heat, oxidation, sludge formation and corrosion. It stands up longer . . . keeps Diesels running better.

Use D-X Motor Oil in your Diesels. If you are located in the Middle West, you have a D-X distributor or bulk station near you.

D-X

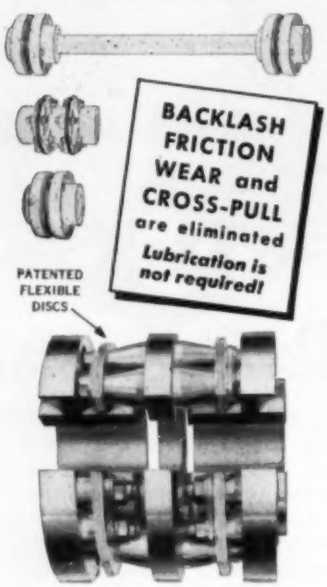
MID-CONTINENT PETROLEUM CORPORATION
TULSA, OKLA.
Waterloo, Ia. Terre Haute, Ind. Omaha, Nebr.
Chicago, Ill. Minneapolis, Minn.

THOMAS
Flexible ALL METAL
COUPLINGS
FOR POWER TRANSMISSION
REQUIRE NO MAINTENANCE

Patented Flexible Disc Rings of special steel transmit the power and provide for misalignment and end float.

Thomas Couplings have a wide range of speeds, horsepower and shaft sizes:
½ to 40,000 HP
1 to 30,000 RPM

Specialists on Couplings for more than 30 years

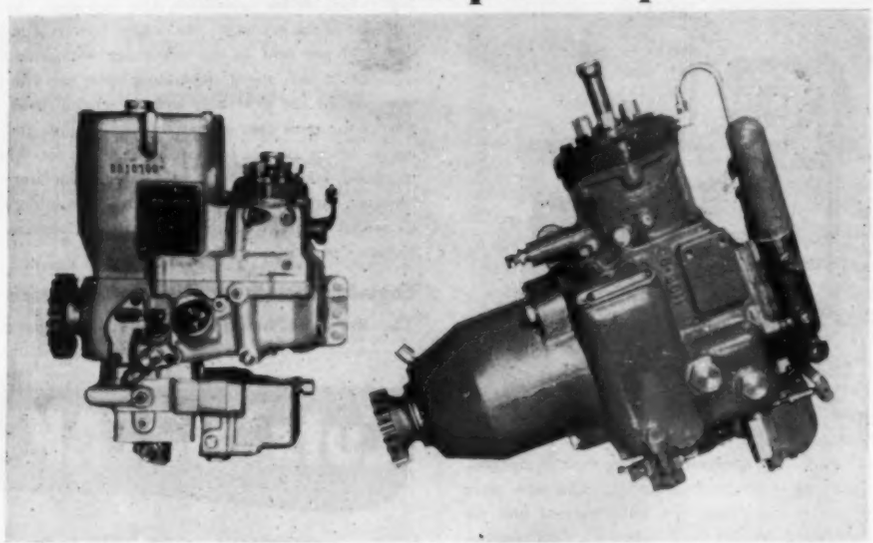


THE THOMAS PRINCIPLE GUARANTEES PERFECT BALANCE UNDER ALL CONDITIONS OF MISALIGNMENT.
NO MAINTENANCE PROBLEMS.
ALL PARTS ARE SOLIDLY BOLTED TOGETHER.

Write for the latest reprint of our Engineering Catalog.

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

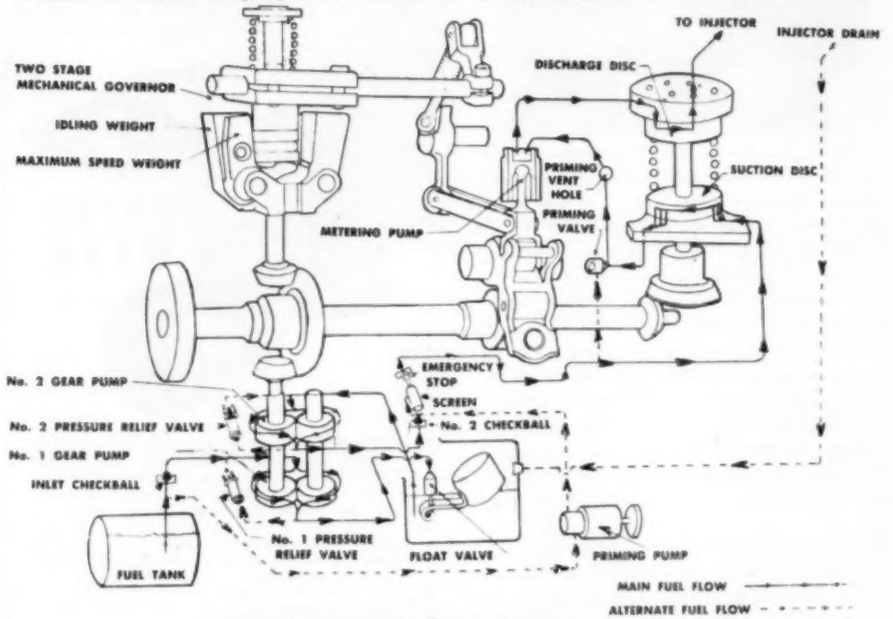
New Fuel Pump Developed



The new Cummins DD (double-disc) fuel pump (left) is 65 per cent lighter in weight and 56 per cent smaller in size than the Cummins single disc fuel pump shown right.

A new refinement to the exclusive Cummins Fuel System is a new fuel pump, 65 per cent lighter in weight and 56 per cent smaller in size, as announced by Cummins Engine Company, Inc. Known as the DD (double-disc) pump, the new unit is designed for longer life operation and for easier servicing. The lighter weight and smaller size facilitates the installation and maintenance of the new pump and further reduces the overall weight of Cummins diesels. Now offered as standard equipment on the 300-hp. and 275-hp. Cummins diesels, the DD pump also is available as optional equipment on other Cummins models. A tandem arrangement of the new DD pump is standard on the 12-cylinder 400-hp. and 550-hp. model engines, the latter being the most powerful high speed diesel engine now in production. The new DD fuel pump is being manufactured in a new plant at the Cummins factory completely tooled with new production machines. Field tested extensively for more than two years, the new DD pump has given outstanding performance on both automotive and stationary applications. Design of the new DD pump enables unit replacement of the fuel pressure pumps, distributor discs, and governor assembly without removal of the pump from the engine. Alignment in the servicing of the pump is minimized since all parts and the bearings in which they rotate are included in the same housing. Reciprocating parts are lighter in weight on the DD

Fuel Flow Diagram of the new Cummins DD (double disc) fuel pump, a new refinement to the Exclusive Cummins Fuel System. Standard equipment on the 300-hp. model NHKS-600 and 275-hp. model NHS-600 Cummins diesels, the DD pump also is available as optional equipment on other Cummins models.



Fuel Flow Diagram

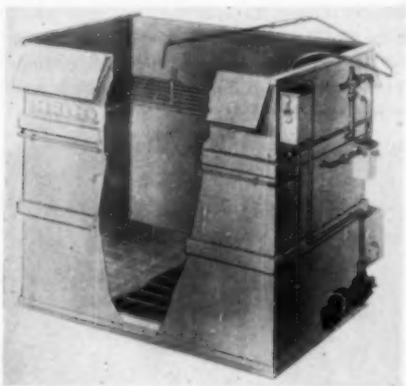
pump, which contributes to greater service life. Needle bearings are used in all possible operating parts. The design of the DD pump is said to eliminate angular stress on governor and throttle linkage which, in turn, reduces wear on bearings and bushings.

Appointment at Superior Engine

F. H. Kilberry

Appointment of F. H. Kilberry as management consultant in charge of the Superior Engine Division of The National Supply Company at Springfield, Ohio, was announced recently. He will make his headquarters at Springfield and will be in charge of all activities of the division. Identified with the diesel engine industry for more than 20 years, Mr. Kilberry until recently was executive vice president of Nordberg Manufacturing Company, Milwaukee. From 1929 until 1945, he was associated with Atlas Imperial Diesel Engine Company, Oakland, California, serving that organization as president for six years.

Vapor-Spray Degreaser

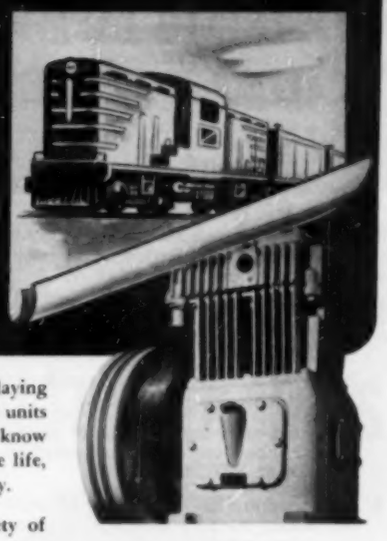


The design of a new, large capacity Circo vapor-spray degreaser has just been announced by Circo Products Company. This new model, called the C-120, was designed for the transportation field and heavy industrial use. It has a vapor depth of 84 inches, inside length of 96 inches and width of 60 inches. The C-120 Circo degreaser is available in either nickel clad, stainless clad or zinc sprayed construction. Its nonflammable, non-explosive solvent is heated by steam, gas or electricity, forming a blanket of vapor which is 84 inches deep. Ample heat input assures a cleaning capacity of 18,000 lbs. per hour. An outside water jacket and inside water coils give double protection against vapor loss. Safe, economical operation is assured by a fully automatic control system.

According to Fenton Davison, vice president, Circo-Solv, the solvent used, is absolutely harmless to all metals. He further stated that depending on size, parts degreased by the Circo vapor and spray method can be removed absolutely clean and dry in 1 to 15 minutes. Detailed information can be secured by writing to DIESEL PROGRESS, File 25, P. O. Box 8458, Los Angeles 46, California.

Look behind this picture..

Quincy
COMPRESSORS
FOR DEPENDABLE AIR SUPPLY



Throughout the nation, Quincy Compressors are playing a vital part in the operation of thousands of Diesel units as well as locomotives. Men in the Diesel industry know that outstanding Quincy features assure long service life, low maintenance costs and above all, dependability.

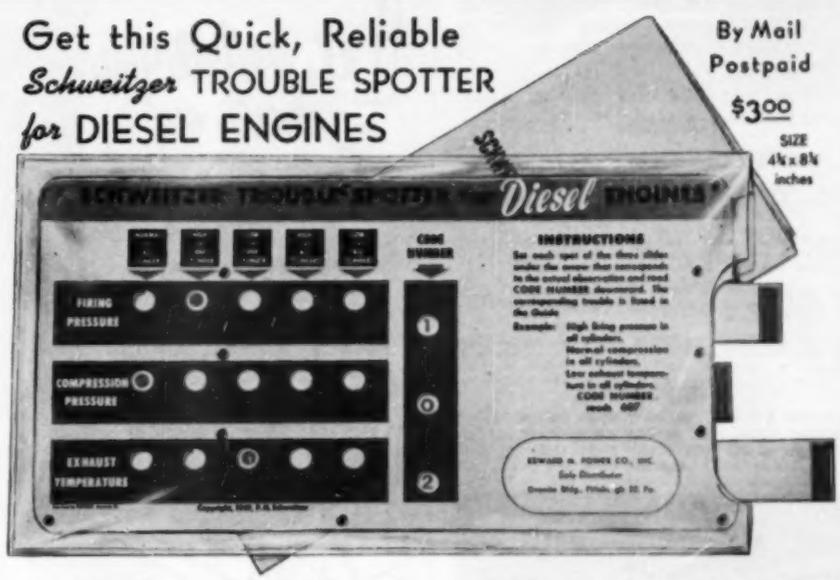
Quincy Compressors are available in a wide variety of sizes ranging from 1 to 90 c.f.m. Have a Quincy specialist help you select the correct type and size compressor to meet your requirements.

WRITE FOR DETAILS AND PRICES

QUINCY COMPRESSOR CO., Dept. K-13, Quincy, Illinois
Branch Offices: New York • Philadelphia • Chicago • St. Louis • Dallas • San Francisco
MANUFACTURERS OF AIR COMPRESSORS EXCLUSIVELY

Get this Quick, Reliable
Schweitzer TROUBLE SPOTTER
for DIESEL ENGINES

By Mail Postpaid
$3.00
SIZE 4¼ x 8¼ inches



SLIDE RULE ACCURACY

This guide prepared by Paul H. Schweitzer, Dr. Eng. Penna. State College, in collaboration with Diesel Engine experts, enables operators and service men to locate and remedy troubles encountered in Diesel engine operation. Makes trouble spotting an easy semi-automatic process, and points unerringly to the proper remedy, thus saving a great amount of time and expense. The guide is snugly encased in stout plastic jacket.

EDWARD M. POWER CO., INC.
600 Granite Bldg. Pittsburgh 22, Pa.

The Guide is divided into two sections. The first section is entitled TROUBLE and it lists the code number for various observations, each with the corresponding trouble or troubles.

The second section is entitled DEFECTS and it deals with the origin of the various troubles.

The two sections are interlocked through a unique numbering system, which makes the use of the Guide extremely convenient.

The TROUBLE section carries code numbers in the left side column. These numerals correspond to those of the Trouble Spotter attached to this booklet.

The second column lists supplementary observations which help to diagnose the trouble or to select the correct one if one code number allows more than one.

The third column lists the probable troubles corresponding to their code numbers.

DIESEL FUEL ADDITIVE YOUR DIESEL NEEDS IT!

By keeping engines clean, with the constant use of TEXON, your maintenance engineer will find the following results:

1. The rated horsepower of your engine will be maintained because of better combustion.
2. Metal parts last longer, and are kept free from corrosive matter.
3. You materially save on your fuel consumption because all fuel is burned when mixed with TEXON.
4. When using TEXON smoking is eliminated. Smoke means wasted fuel. No smoke, no carbon means no waste.
5. Stuck valves and rings mean poor combustion. TEXON eliminates poor combustion.
6. The use of TEXON stops sludge, keeps oil cleaner longer and saves frequent filter changes.
7. You will have less pump and injector troubles if you use TEXON. This additive keeps them clean.
8. Keeping engines clean chemically with TEXON eliminates cleaning the engines mechanically, which means less downtime.
9. Storage tanks are kept clean as if they had been steel-wooled.

. . . USER'S COMMENTS

"Just by eliminating the necessity of having to remove and clean injectors, TEXON has more than paid for itself in labor saved." J. V., Acapulco, Mexico.

"The performance of our diesel trucks has never before been as smooth or efficient as it is today with the use of TEXON diesel fuel additive." D. F. B., Mexico City, Mexico.

"Since using TEXON we have not had one instance of fuel-pump clogging which in the past was a regular procedure." F. S., Jennings, La.

"Although your claims for TEXON seemed exaggerated, we must admit that it does what you claimed. It has not been necessary to clean the tank, pump or injectors in seven months, and the saving in fuel is even greater than we expected." O. D. Drilling Co., Houston, Texas.

WRITE FOR BULLETIN. WE HAVE SOME CHOICE DEALER TERRITORY OPEN—FULL DETAILS ON REQUEST. TEXON CAN SAVE MONEY FOR EVERY DIESEL ENGINE USER. TRY IT.

TEXON
TRADE MARK
LONE STAR CHEMICAL CO.
HUMBLE ROAD, HOUSTON 16, TEXAS

First Diesel for Virginia Railroad

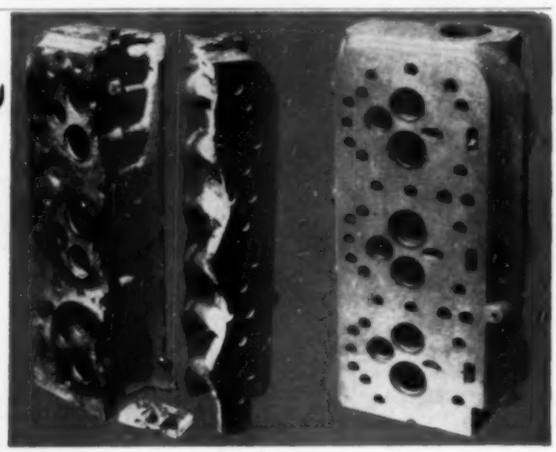
Shown here are the eighteen persons who recently took a ride on the first diesel engine ever to run on the tracks of the Winchester and Western Railroad at Winchester, Virginia. The test spin of the $87,500 Lima-Hamilton 120-ton diesel took them down the line to Strasburg, Virginia. The engine, which may haul sand and lumber over the local road, generates a starting force of 1,000 hp. From left to right are: J. E. Kerr, W. & W. engineer; Clyde Haymaker, road foreman of the Baltimore and Ohio; E. H. Davidson, Jr., service engineer of Lima-Hamilton; J. G. Fosbrink, president of W. & W. Railroad; E. Johnson, B. & O.; E. E. Bowers, B. & O. agent; Rev. William E. Eisenberg, pastor of Grace Lutheran Church, Winchester; Mrs. E. E. Bowers, B. & O. chief clerk; Mrs. J. G. Fosbrink, W. & W. secretary; Herbert S. Larrick, general counsel for W. & W.; J. M. Cavey, B. & O. assistant trainmaster; Mrs. Lacey McFall, Virginia Glass Sand Corp. secretary; H. Delmer Robinson, president of the Shenandoah Valley Apple Blossom Festival; W. M. Murphy, B. & O. superintendent; E. E. Baker, B. & O. ticket agent; and M. P. McCoy, Lima-Hamilton service engineer. Several of the people had a turn at the controls on the run to Strasburg.

Broadening Railroad Service

To broaden its service to railroad customers, the American Locomotive Company has assigned field locomotive sales, service and renewal parts authority to the field districts of the General Electric Company, effective May 15th. American Locomotiveand General Electric have collaborated in the design, manufacture and sale of Alco-GE locomotives for years. The new step will give Alco-GE greatly increased sales coverage. All transactions relative to field locomotive sales and service now will be handled through the appropriate General Electric district offices, under the direction of Alco-GE headquarters at Schenectady, New York, W. S. Morris, vice president of American Locomotive Company, in charge.

American Locomotive will continue to be the contracting party for all sales, including renewal parts. Its district sales personnel will coordinate their activities through General Electric district offices. In the sale of products of its Railway Steel Spring and Alco Products Divisions, Alco will continue to serve the railroads and industry as a whole from its own district offices.

Let me tell you about my Operation!



"I had a cracked cylinder head — busted right down the middle. Dr. Guth operated — no pain at all — I feel fine. Ready to start life all over again. Let me tell you if your Diesel engine block cracks open and the case looks hopeless, call in Doc Guth for a prompt surgical welding job."

Note: Actually we don't supply pretty nurses as part of our RENEWAL service but everything else comes with the job.

GUTH COMPANY
McPHERSON, KANSAS

SERVING THE NATION FROM IT'S CENTER

News Sales Office for Cummins Diesel Sales

Especially designed and completely equipped to handle the sales and servicing of Cummins diesel engines, the new location of Cummins Diesel Sales Corporation was formally opened in St. Paul, Minn., recently with a ribbon-breaking ceremony and an open house. The new facilities—a one-story building of face brick and concrete blocks, and with 14,400 square feet of floor space—was necessitated by the growth of the Cummins business in the Twin Cities area. The building has 12 inside truck bays, and complete facilities for installing new or rebuilt engines. Diesel operators in the trucking, construction, earth-moving and other heavy industries were guests at the open house, and inspected the modern plant and its facilities. Of particular interest was an activated cutaway model of a Cummins NHRS-600 engine. This engine, introduced in the spring of 1949, has a maximum of 300 hp., turning at 2,100 rpm. The territory covered by the St. Paul offices includes Minnesota, North Dakota, and seven counties in western Wisconsin. Complete facilities also are located at Hibbing, Minnesota.

Elliott Vice President Named ASME Fellow

M. A. King

M. A. King, engineering vice president of the Elliott Company, with headquarters at Jeanette, Pa., has recently been named a Fellow of the American Society of Mechanical Engineers. This honorary appointment is conferred only upon engineers with acknowledged engineering attainment and at least 25 years of active practice. The grade has been given Mr. King in recognition of his achievements in turbine design. His principal contribution to this field has been the development of standard commercial lines of turbines which incorporated practices previously limited to specially constructed individual machines. He was also a pioneer in the development of turbine and gear drive for pumps used in hydraulic dredging.

Mr. King has been with Elliott for the past 34 years, except for a period of five years spent with Worthington Pump and Machinery Corporation. He joined the original Kerr Turbine Company, Wellsville, N. Y., in 1916, becoming chief engineer shortly after Kerr was purchased by Elliott in 1923. He moved to Jeannette with the turbine department in 1927 and was named turbine manager in 1932. In 1941 he was appointed manager of engineering for the company, becoming engineering vice president in 1948.

Elected Vice President of Electric Auto-Lite

Election by the board of directors of Joseph A. Cappi as vice president of The Electric Auto-Lite Company was announced recently by Royce G. Martin, president of the company. Mr. Cappi, who has been an employee of the company and predecessor organizations since 1925, will serve as a vice president in the production division. During the war period, Mr. Cappi was plant manager of the Metals Manufacturing Division of the company, in Long Island City, N. Y., which was engaged in shell production. Following the war, he was made plant manager of the Buckeye Bumper Division in Springfield, Ohio, in charge of the production of bumpers, hub caps and spring covers. For the past few months, he has been special assistant to B. A. Fay, vice president in charge of production.

RN
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DIESEL & DUAL-FUEL ENGINES

5 to 150 H.P.

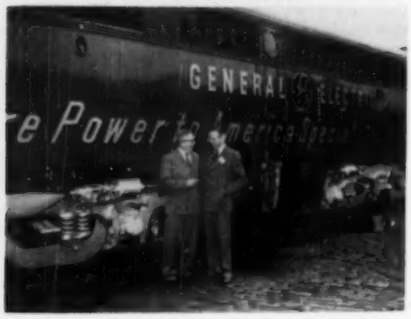
Robustly designed for continuous service and ease of maintenance and backed by forty years' experience.
INDUSTRIAL
9 models 1–6 cylinders, 5/150 h.p. at 600/1000 r.p.m.
4 models 1–4 cylinders, 13/52 h.p. at 1500 r.p.m. (B.E.S.A. ratings.)
60-cycle A.C. or D.C. Generator Sets up to 95KW.
MARINE PROPULSION
8 models 2–6 cylinders, 18/150 h.p. at 1000 r.p.m.
4 models 2–4 cylinders, 22–48 h.p. at 1200 r.p.m.
3 models 2–4 cylinders, 27/52 h.p. at 1500 r.p.m. (B.E.S.A. ratings.)
MARINE AUXILIARY
Generator, Pump and Compressor Sets for Shipboard use—range as Industrial.

APPLICATIONS INVITED from firms in the U.S.A. interested in the possible distribution of our range of diesel engines. Stock and Credit Facilities available.

RUSSELL NEWBERY & CO., LTD.

ESSEX WORKS, DAGENHAM, ESSEX, ENGLAND. Cables: Diesel, Dagenham

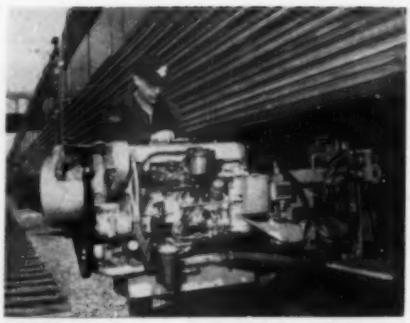
More Power for Diesel Trains



When the apparatus department of General Electric Company launched its "More Power to America Special" train in Grand Central Terminal, New York City, a "new era" in the display and use of electrical products, processes and techniques was begun, according to General Electric Company and a number of cooperating industries. The 10-car stainless steel train, powered by a modern 4,500-hp., 2-unit Alco-GE diesel-electric locomotive, will go on an exhibition tour for about a year, with the first appearances in numerous Eastern cities.

A long established Chicago industry played an important part in "powering" the train. The Buda Company furnished 16 Buda "Lanova" 6-cyl. 4-cycle diesel engines to power the undercar power plant. This unit, which will be used for suplying power for train lighting, heating, air conditioning, the powering of the electric stoves in dining cars, and even for some of the exhibits on display in the baggage car of the train, was built by Buda engineers working with General Electric experts. It is pointed out by engineers of both companies that the installation of such under car power plants throughout the train will not only provide for even car temperatures, heating and air conditioning, but will be a demonstration of how the trains of the near future can relieve the burdens imposed on present day steam locomotives or diesel engines, thus enabling trains to haul more cars at better speeds.

Also of interest to the Chicago area is the fact that the "More Power to America Special" upon completion of its nation wide exhibition tour of 150 of the country's key industrial centers during 1950-1951 will be sold to the Chicago, Rock Island and Pacific Railroad and that the stainless steel coaches were built by the Pullman Standard Car Manufacturing Company in its Worcester, Mass., plant. General Electric says that more than 2,000 electric



products and processes are on display in the train, many of them operating exhibits. One major exhibit was built by the Franklin Institute of Philadelphia. Products exhibited represent more than a score of General Electric plants throughout the country. They show the advantages of electrification in terms of increased production, reduced costs, and improved product quality. The exhibits have been grouped in eleven different, but related sections, such as power generation, distribution, and transmission; drives and controls; materials handling; welding; heating; renewal parts and service shops; industrial lighting; components for industry; measurements national security; and civic improvement.

NEED TRAINED DIESEL MEN?

Hemphill graduates have received broad, practical training in the operation, maintenance, and servicing of diesel engines.

On your job they can save you money, and make you money.

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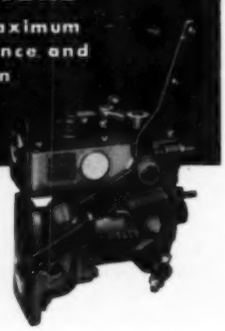
Standard for Diesels

PIERCE GOVERNORS
assure maximum performance and protection



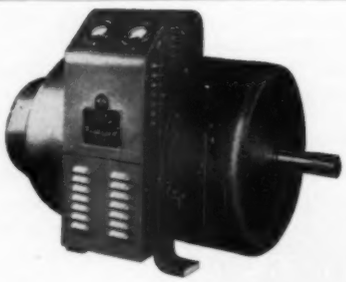
Pierce Centrifugal Governors give exact control of engine RPM to meet the varying conditions of any job. Engine protection is guaranteed!

PIERCE governors engineered specifically for Diesels assure long, trouble-free operation . . . usually for the life of the engine. Many Diesels feature PIERCE as standard equipment to assure maximum protection, better performance and less maintenance.

PIERCE replacement governors to fit most engines are available through your local distributor.

For your distributor's name or for specific information on new engine design or special governing problems, write or call Sales Department, Pierce Governor, 1603 Ohio Ave., Box 1,000, Anderson, Indiana.

PIERCE GOVERNORS
"FIRST NAME IN GOVERNORS"



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When and Where You Need It!

●With E-M Packaged Generators, you can generate the same kind of steady, dependable voltage you expect from a big-city power line . . . quality voltage that keeps lights bright and machines and appliances working smoothly, evenly.

Combining meters, exciter, generator and voltage regulator in a compact unit, Packaged Generators are an original E-M development. Ratings range from 3.75 to 187 kva.

Our publication *Synchronizer 27* is packed with illustrations of on-the-job applications of this E-M packaged power. Send for a free copy.

ELECTRIC MACHINERY MFG. COMPANY
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E-M SPECIALISTS IN GENERATOR ENGINEERING

Titeflex
All-Metal Flexible Tubing

keeps Oil Field Diesels

On the Job

Diesel mechanical-drive rotary rigs for deep oil well drilling represent a considerable capital expenditure; therefore they must be kept operating constantly with minimum shutdown time for repairs. When TITEFLEX Flexible tubing is used for diesel water lines, fuel lines, and exhaust lines, maintenance becomes negligible. The all-metal construction of TITEFLEX tubing assures reliable performance for many years.

Throughout industry, TITEFLEX all-metal flexible tubing is helping to keep expensive machinery and equipment "on the job". TITEFLEX tubing is available with innercore made of one of five different metals: brass, bronze, monel, inconel, and stainless steel. One of these metals will be exactly suited to your requirements. Write for Catalog No. 113 for complete information.

Titeflex, Inc.
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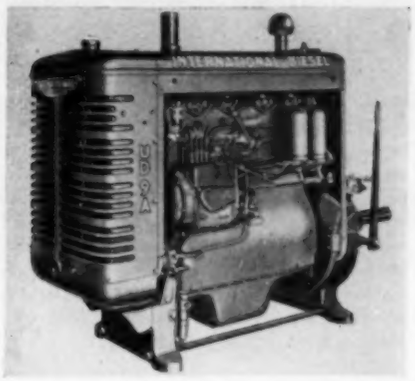
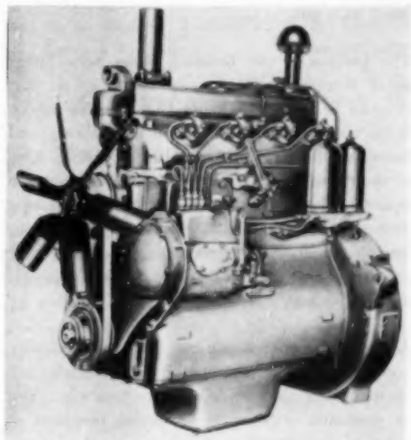
Exclusive Manufacturers of Titeflex high quality products for more than 30 years

sales Offices: CHICAGO CLEVELAND DETROIT PHILADELPHIA LOS ANGELES BOSTON SAN FRANCISCO TORONTO

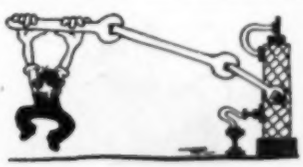
International Harvester Offers More Powerful "9" Series Diesels



Increased horsepower, improved performance diesel power units and automotive engines of the 4-cylinder International "9" series, are now available in new UD-9A models, International Harvester Company has announced. New features of the basic "9" engine include: redesigned pre-combustion chamber and piston; the "A" series I. H. fuel injection pump; simplified injection nozzles; counterbalanced crankshaft and new connecting rods. The improvements establish a higher compression ratio, 15.7 to 1 compared to the former 14.4 to 1, and greater burning efficiency with corresponding increase in working horsepower per unit of fuel consumed. The power unit develops 62.5 hp. at 1,600 rpm.



The UD-9A automotive engine operates at governed 1,800 rpm., delivering 70 hp. at that speed. Both power unit and automotive engine have the exclusive inbuilt International gasoline conversion all-weather starting system; full-pressure lubrication of moving parts, and other time-proved features of previous models. Complete specifications and other information are available from International Harvester Company, Consumer Relations Department, 180 N. Michigan Ave., Chicago 1, Ill.



AIR-MAZING FACTS

BY O.SOGLOW

HOW SMALL IS SMOKE? Smoke is made up of carbon particles that average about 1/250,000th of an inch in diameter. It would take over 200,000,000 of them to cover the head of a pin!

PROFIT IN THE AIR! Clean air boosts department store profits by reducing dirt damage to merchandise and store interiors. Many stores keep air free of dust and smoke with Electromaze filters. Unique "file drawer" design makes Electromaze electronic air filters cheaper to install, easier to clean.

COMFORT TO COMPRESSORS! Compressors stay hale and hearty with Air-Maze oil bath air filters that "scrub" air clean in a bath of oil, prevent dust from damaging polished working parts.

WHETHER YOU build or use engines, compressors, air conditioning and ventilating equipment, or *any device using air or liquids*, the chances are there is an Air-Maze filter *engineered* to serve you better. Representatives in all principal cities, or write Air-Maze Corporation, Cleveland 5, Ohio.

AIR-MAZE
The Filter Engineers

AIR FILTERS
SILENCERS
SPARK ARRESTERS
LIQUID FILTERS
OIL SEPARATORS
GREASE FILTERS

KURZ AND ROOT
GENERATORS AC and DC

Backed by over 50 years Experience Serving Industry

Modern design, efficient performance, long life with minimum maintenance, whether powered by electric, gasoline or Diesel, have made Kurz and Root Generators standard equipment for many leading manufacturers. Kurz and Root Generators have built-in quality that is instantly recognized. Tell us your specific needs and applications . . . we'll gladly recommend the type generator to give you the service desired.

Our AC and DC Generators are adaptable to cranking Diesel and Gasoline engines against full compression . . . silicone (Class H) insulation available.

AC Generators in ratings 1 to 100 KVA can be furnished. Top illustration is a two-bearing self-excited, self-regulated type . . . lower, two-bearing direct connected exciter type.

DC Generators are available in ratings 1 to 100 KW. At the right is a two-bearing self-excited type . . . also available with direct connected exciter.

AC and DC Generators can also be furnished in single bearing, flange mounted type . . . sealed, pre - lubricated, ball bearing construction.

KURZ-ROOT Company
APPLETON • WISCONSIN

AIR COOLED
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H. P.
DIESEL
$275.00

SEND FOR DESCRIPTIVE FOLDER

Crofton
DIESEL ENGINE COMPANY
San Diego, California

It pays to specify . . .
THE LANOVA COMBUSTION SYSTEM*

The controlled rotary turbulence of the Lanova Combustion System gives Diesel many advantages, such as:
- High combustion efficiencies
- Smooth, powerful push of working pressures on pistons
- Elimination of jarring combustion pressure knocks
- Clean exhaust and easy starting

Be combustion-wise and economize. Specify Lanova in your next Diesel.

Lanova Corporation, 38-19 30th St., Long Island City 1, N. Y.

*Available only in Diesels manufactured by Lanova licensees. Send for names of these leading engine builders.

THE HEART OF THE DIESEL

LANOVA makes Diesels purr

F-M Dedicate New Chicago Sales and Service Branch

In keeping with their policy of erecting modern new sales and service offices throughout the United States, Fairbanks, Morse & Co., Chicago manufacturers, have now completed their fifth such construction project. This is the new building housing the Chicago sales and service branch recently dedicated on May 23, 1950, and located at the corner of South State Street and 16th Streets, Chicago.

The new structure, with the site, represents an investment in excess of $500,000.00. The building is of the latest modern design and includes not only the Chicago branch office, but a modern scale shop, modern diesel repair shop, warehouse and display floor. The main entrance of the building with a footage of 145 feet on State Street and 250 feet on 16th Street, is on State Street, with the address of 1550 South State. The new building is extremely attractive, the entire facade is of contemporary architecture with open front glass construction involving large panels of plate glass set in wood mullions extending from floor to ceiling. The building is of pressed brick trimmed with Indiana limestone. Stainless steel letters three feet high above the glass front spell out the company's name and these are silhouette illuminated at night.

The portion of the building along State Street which involves approximately 10,000 square feet of space is devoted to general and private offices. It has acoustical ceilings, asphalt tile flooring, and fluorescent lighting set flush with the ceiling. One of the features of the office design is the installation of a large number of metal filing cabinets flush with the wall, avoiding unsightly projections into the room. A large room is also provided for conference purposes. The office is also completely air conditioned.

At the recent open house over a thousand visitors, including dealers, customers, city officials and company officials attended. The offices were filled to profusion with many beautiful bouquets of flowers. An excellent lunch and refreshments were served during the afternoon to all who were present. Among the company officials who visited the branch during the day to be welcomed by J. A. Cuneo, branch manager, were: Colonel Robert H. Morse, chairman of the board; Robert H. Morse, Jr., president; O. O. Lewis, vice president in charge of sales; L. A. Keeler, vice president and comptroller; L. W. Stolte, secretary and treasurer; Page Procter, New Orleans branch house manager; Henry J. Barbour, manager sales promotion and public relations, and many others.

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DRYSEAL
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PRESSURE PLUG

. . . seals pressure-tight without the use of sealing compounds. Features the "Dryseal" Pipe Thread originally developed for use with SO_2, ammonia, and other refrigerants. Offers a valuable solution to leakage problems in high pressure equipment of all kinds.

Unique design of the "Dryseal" Thread provides actual crushing and sealing at both major and minor diameters, effectively preventing spiral leakage, even under extreme pressures.

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75 KW A.C. Generator at 1,200 RPM.

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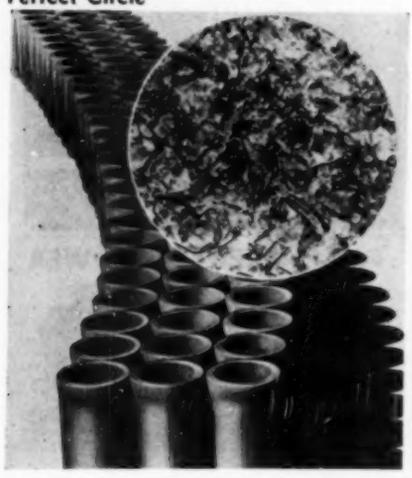
1443 First Ave., Mankato, Minn.

Recent Meeting of Association of American Railroads

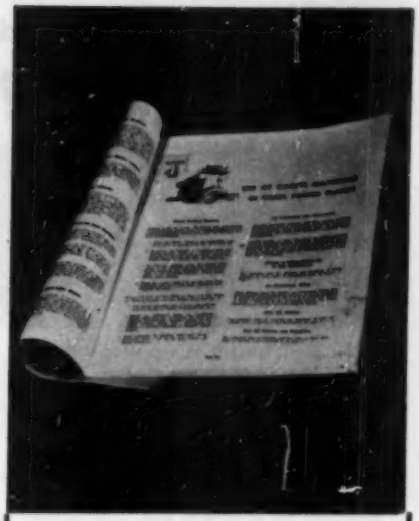
Members of the Diesel Locomotive Parts, Purchasing and Storekeeping Committee 42 of the Association of American Railroads, who recently took part in a meeting and inspection tour at the Eddystone Plant of The Baldwin Locomotive Works. R. B. Crean, assistant vice president of Baldwin, was in charge of the program. Those in the photograph are (left to right): Graham Lawson, Canadian Pacific Ry.; L. H. Haynes, Seaboard Air Line R.R.; G. S. Grassmyer, Baldwin; R. M. Fraser, New York, New Haven & Hartford R. R.; A. Hoefer, Baldwin; L. G. Kohler, Baltimore & Ohio R. R.; P. E. Carlson, Chicago, Burlington & Quincy R. R.; E. F. Sheehan, Baldwin; T. W. Greenawalt, Missouri-Kansas-Texas Lines; C. E. Schnars, The Pennsylvania R. R.; W. A. Carney, Boston & Maine R. R.; J. A. McMillan, Illinois Central R. R.; R. Radford, Baldwin; A. C. Ricketts, Baldwin (rear); G. C. Sheridan, Chicago, Milwaukee, St. Paul & Pacific R. R. (front); W. G. Rathert, Missouri Pacific Lines; H. R. Carroll, Chicago & North Western Ry.; E. F. De Lisle, New York Central System; J. N. De Laney, Baldwin; M. C. Brinson, Atlantic Coast Line R. R.; A. N. Laret, St. Louis-San Francisco Ry.; O. T. Rhode, Union Pacific R. R.; C. J. Kubler, Kansas City Southern Ry.; R. H. Pauling, Erie R. R.; A. G. Denham, St. Louis-San Francisco Ry.; T. Cummings, Baldwin; F. W. Pettit, Western Maryland Ry.; W. L. Fennimore, Baldwin; G. J. House, Erie R. R.; R. B. Crean, Baldwin; Elmer Larson, Denver & Rio Grande Western R. R.

Cylinder Sleeves Manufactured by Perfect Circle



Cylinder sleeve castings that, when machined and installed in an engine, will considerably outwear sleeves cast by conventional centrifugal methods, and that cost less than statically-cast sleeves, are now in volume production by Perfect Circle Corporation. Perfect Circle is making only the rough castings that are machined by sleeve and engine manufacturers into cylinder sleeves. No machining is done on the castings by Perfect Circle. An entirely new centrifugal casting process is being used to make the Perfect Circle sleeves. The new process is the result of nearly 10 years of research and developmental work. Originally set up as a project to develop better piston ring castings, the knowledge gained while working on the project turned out to be basic to the production of cylinder sleeve castings.

Castings made by Perfect Circle's new process combine features of sleeve castings made by the static casting method and those made by the conventional centrifugal casting method in which water-cooled molds are used. Perfect Circle's sleeve castings are gray as cast—they require no annealing. Out-of-roundness of the castings is held to a maximum of .010 of an inch. The castings are extremely free of dirt, are not porous, and not subject to shrinkage.



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THIS illustrated digest contains a wealth of sound, practical ideas to expedite Diesel maintenance and keep operating costs low. Gives details on such subjects as:

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The following letter from a mid-western diesel engine rebuilder tells the story:

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NEW . . .
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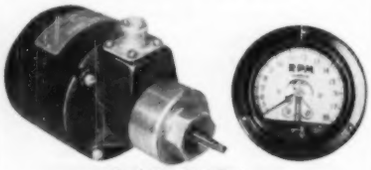
Simplified RUGGED *Design!*



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WEST COAST DIESEL NEWS

By **FRED M. BURT**

MURPHY diesel engines installed in British Columbia fishing vessels at Lipsett Engine & Mfg. Co., Vancouver, include a 190-hp. marine engine in B. C. Packers' packet *Maple Leaf 3*, and seven M E150's in other B. C. Packers' boats and Queen Charlotte Fisheries' *Seiner*.

THE FISHING vessel *Petrina F* of Monterey has recently been repowered with a 220-hp. Atlas Imperial marine diesel.

PURCHASED by C. G. Perry Drilling Co., Bakersfield, for use in local oil field drilling, from Anderson-O'Brien Co., two twin 4-cyl. General Motors diesels, each unit about 175-hp., one to power a mud pump, the other for draw works.

DESIGNED by Edwin Monk and Lorne Garden, Seattle, 42-foot troller *Arabella II*, built at Brentwood, B. C., for G. T. Westinghouse, of Victoria, and powered with a 6-cyl. Fairbanks-Morse marine diesel.

USED in ditching for water lines in the huge Lakewood Park housing project, a Parson ditcher has been re-powered with a "Caterpillar" D4600 diesel for Cannell & Losch, Long Beach contractors, to replace a gasoline engine.

POWERED with G.M. 225-hp. marine diesel, 42½-foot *Martha June*, fishing boat, built by Sea Boat Co., Costa Mesa, for Gene and Gerry Hatchez, of Newport Beach, Calif.; reduction through 3:1 Western Gear.

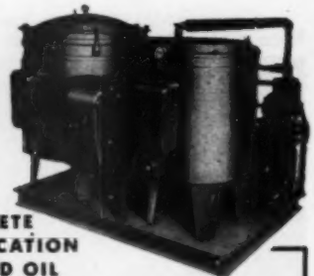
AT WILBUR Boat Yard, San Pedro, for C. F. Monnich and H. M. Boyd, Pasadena, fishing vessel *California Republic* re-powered with a "Caterpillar" 53-hp. D-315 diesel, and with new 3:1 Twin Disc reduction gear.

COMBINATION boat 38-foot *High Seas*, owner Walter Ficken, Orange, Calif., has been re-powered with an unusual Nordberg diesel installation, a Model 4FS1 1-cyl. engine. Work done at Wilmington by H. G. McKinney Co.

SUPPLIED to Dunlop & Graham, Los Angeles drilling contractor, for use in South American fields, by Anderson-O'Brien Co., two 20-kw. G.M. diesel, Palmer generator, units, and 2-cyl. 40-hp. quads for use on mud pumps, two similar unit twins for Ideco draw works—all of the units have interchangeable parts.

CATHERINE PALADINI, 22-year-old trawler, owned by A. Paladini, at yards of Sausalito (Calif.) Shipbuilding Co., re-powered with new D375, 8-cyl. 270-hp. "Caterpillar" diesel from distributor Thomas A. Short Co., San Francisco; also fitted with 4:1 Snow & Nabstedt reverse and reduction gears, and Twin Disc 3:1 front power take-off.

SUPPLIED from El Paso branch of Worthington Pump & Machinery Co. for American Smelting & Refining Co., at San Luis Potosi, Mexico, a 912-hp., 8-cyl. Worthington diesel engine for added power in mining operations.



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FOR DEPENDABLE FUEL INJECTION EQUIPMENT

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DIESEL ELECTRIC POWER
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Unit Capacities 10 to 1875 Kva A.C. 50-60 Cycles Various Voltages

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Regulates engine jacket water temperature automatically.

Cold engines are inefficient and good hand regulation is impossible. 2" pipe size with 3-way valve action is only $85.

Some recent installations have been made on: 120-hp. Fairbanks-Morse generator set, 640-hp. Busch-Sulzer marine, 70-hp. Kahlenberg marine, 200-hp. Atlas pumping unit with radiator, 150-hp. Lorimer marine, 820-hp. Cooper-Bessemer marine, Venn-Severin stationary.

Write for literature and piping diagrams, giving make, model number, and horsepower of your engine.

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AC-DIESEL
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PRACTICALLY NEW

9—100 KW 3/60/460 WORTHINGTON DIESEL MODEL BB5
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Price $6,500.00 each, f.o.b. Trenton

All with Westinghouse Generators, Complete with Exciters, Cooling Systems, Starting Equipment, Switchboard, Silencers, etc.

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EASTERN
SCRAP & SALVAGE CORP.
65 Muirheid Avenue Trenton 7, N. J.

RECENT diesel installation by Short Line Diesel Maintenance, Fisherman's Wharf, San Francisco—3-cyl. G.M. diesel in troller *Glacier* for G. Roland, San Francisco; also sold to Wm. Cooper, San Francisco, for new 38-foot troller under construction by Siino Boat Works, Pittsburg, Calif., a 6-cyl. G.M. diesel with 3:1 Twin Disc reverse and reduction gear.

SUPPLIED by Engine Sales & Service, Los Angeles, a 6½-kva Witte diesel-electric generating unit, to Harry Wells, Mina, Nevada, for power lights at his fishing resort.

To re-power a P & H truck crane for Bragg Crane Service, Long Beach, Calif., a Cummins HB-600 130-hp. diesel engine, from Cummins Service & Sales, Los Angeles.

A NATIONAL Supply Co. No. 58 draw works supplied to Superior Oil Co., Bakersfield, Calif., is powered with a G.M. twin 6-cyl. diesel, 260-hp. continuous at 1,600 rpm.

PURCHASED from Shepherd Tractor & Equipment Co., Los Angeles, by Astilleros de Santa Rosalia, Santa Rosalia, Baja, Mexico (where a new shipbuilding industry is developing), for two new steel shrimp boats, two Caterpillar D1300 marine diesels and two 2:1 Twin Disc reverse and reduction gears.

FORMER purse seiner *Juanita*, wrecked two years ago, sold to Tony and Guido Tofanelli, Alameda, has been carefully rebuilt into a modern new combination sardine and tuna purse seiner, the 82-foot *Sea Mist*, to be powered with a 330-hp. Fairbanks-Morse diesel engine.

INSTALLED in fishing boat *Admiralty*, at the Friday Harbor shipyard, for owners Scotty McDonald and Art Swarsvog, a new 120-hp. Washington diesel.

FOR LACEY Trucking Co., Los Angeles and Bakersfield, by Cummins Service and Sales, Los Angeles, a Lorain Moto-crane re-powered with an HRB-600, 160-hp. Cummins diesel.

PURCHASED by Ralph Sorkness for Sorkness Truck Lines, San Diego, for highway trucking, two Kenworth trucks powered with 300-hp. NHRBS-600, Cummins diesel engines.

FOR DEL RIO Ranch, San Diego County, a 2-cyl. Sheppard diesel power unit on a U. S. Pump, Inc. (Los Angeles) deep-well turbine pump, for irrigation and other water supply.

FOR USE in the Ensenada fishery off Baja, California, the LCVP conversion at Rask Boat Yard, Coronado, for owner Jim Callian, will take a 165-hp. G.M. diesel for power, and 10-hp. Crofton diesel for auxiliary.

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Four machines giving range from the smallest up to crankshafts with stroke of 15" and 200" O.A.L. Complete grinding service for locomotive, stationary, marine, automotive and compressor crankshafts.

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25 KVA, 1200 RPM, A. C. Generator with Direct Connected Exciter.

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Please send me Bulletin A-1214 on your Class 72 Separators.

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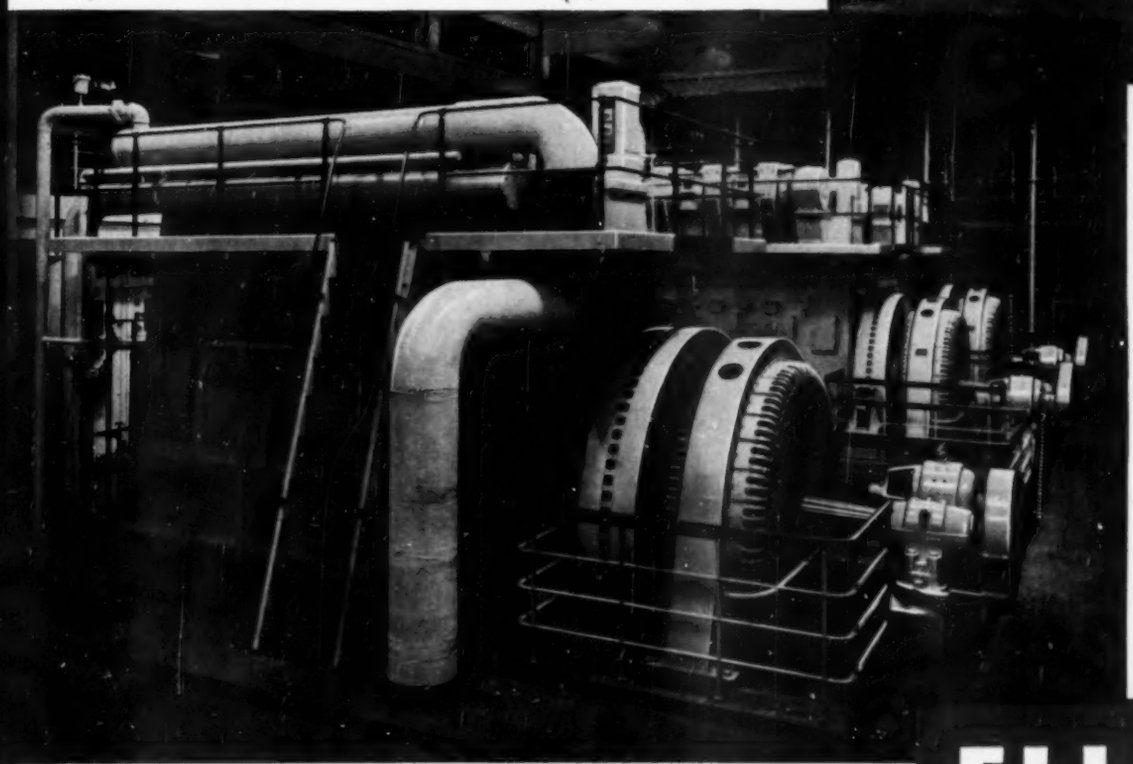

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The three smooth-running Elliott 500-kw generators, teamed up with their good Fulton engines, contribute their full share to this fine record — which is typical of the result wherever Elliott generators, good Diesels, and intelligent management get together.

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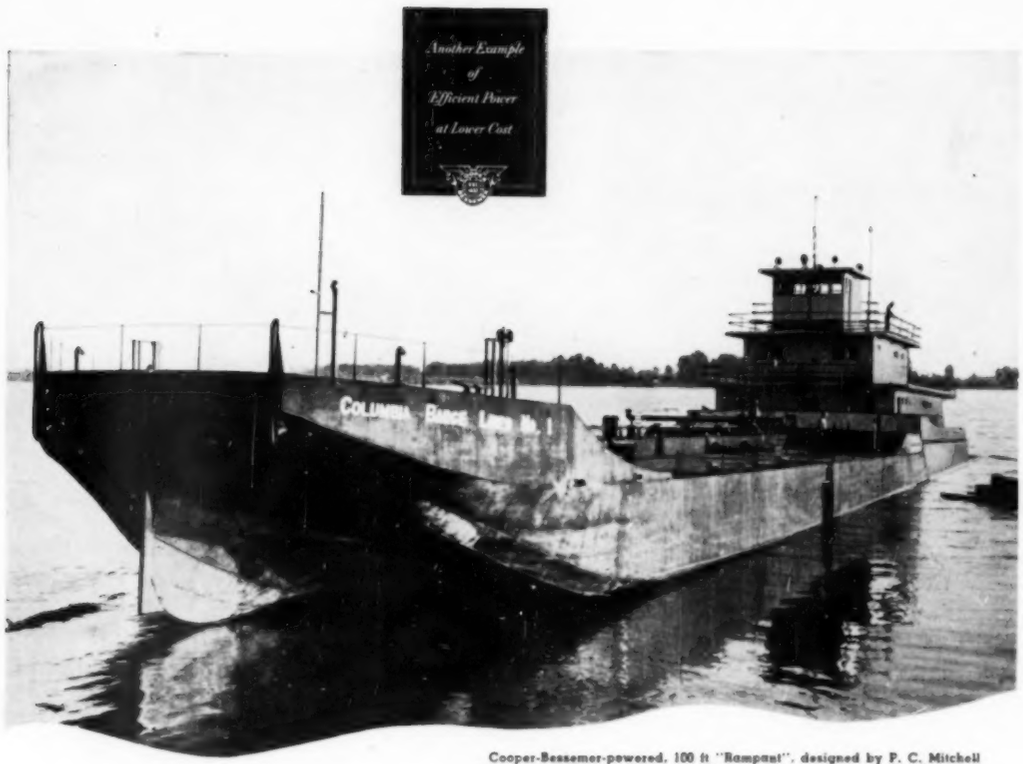

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The "Rampant", one of the newest and finest workboats on the Columbia River, is also the first of its type. It not only features a unique integrated barge and tug design, but is the first towboat on this shallow river to be built for the use of husky, slow-speed diesels.

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